modem machine Shop

HOW TO MACHINE STAINLESS Soo Pago 108 TRAINING TOOL AND DIEMAKERS

JUNE 1959

See Page 144

precision

promised ...precision delivered!

That's the story of American Drill Jig Bushings

When precision is expected, you can depend on American! American distributors offer a complete line of standard, offthe-shelf precision drill jig bushings in your city.

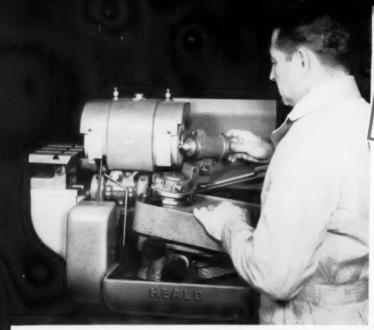
Let us send you our new catalog with drill bushing selection tables — making it easy for you to specify the proper bushings, for all your bushing needs.

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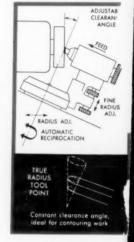
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5107 PACIFIC BOULEVARD . LOS ANGELES 58. CALIFORNIA

TRADE MARK









New Model 4 TOOL SHARPENING MACHINE

provides highest precision and economy

for both TRUE RADIUS and

ELLIPTICAL POINT tool grinding

SETTING new standards of accuracy and economy, the new Heald Model 4 Tool Sharpening Machine is available for both true-radius and conventional elliptical-point tool grinding. The True Radius arrangement provides a constant tip radius and constant clearance angle, permitting greater accuracy where the point of contact with the tool varies with the configuration of the workpiece, as in contoured shapes. Where such tool geometry is of no advantage, the Model 3 Tool Sharpening Machine, capable of grinding elliptical point

tools only, offers desirable savings in initial cost.

With either model, you get fully automatic tool reciprocation providing uniform and repetitive tool tip accuracy which permits one operator to tend several machines at the same time.

Remember — in metal cutting, it's the precision of the tool tip that guarantees precision results. Ask your Heald representative for complete information on this new Model 4 Tool Sharpening Machine, or send for Bulletin 2-4-3, Issue 1.

It PAYS to come to Heald



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Published in the Machine Tool Capital of the World

Vol. 32, No. 1, June, 1959

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Management	HOW TO SOLVE YOUR SUPERVISORY PROBLEMS
Carbide Tooling	A CASE OF CUTTING TOOL ANALYSIS
Gaging	HOW TO INCREASE DIAL INDICATOR USEFULNESS
Machine Maintenance	REBUILDING COSTS CUT BY UNUSUAL WELDING PROCESS 136 By Gilbert C. Close
Employee Training	TRAINING TOMORROW'S CRAFTSMEN TODAY
Trepanning	TREPANNING PROVIDES TIME-SAVING ADVANTAGES
Shaping	SHAPING TOOL SHANKS TO HIGH REPETITIVE ACCURACY 158
Boring	AUTOMATIC LOADING SPEEDS MULTIPLE OPERATIONS 160
Forming	USING A LATHE AS A FORMING MACHINE
Honing	LIQUID HONING INCREASES GEAR CUTTER LIFE
Jigs	C-CLAMPS CONVERTED TO DIE SET PULLERS

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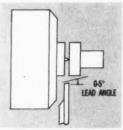
features in

Assembling & Finishing...Inspecting, Testing & Control...
Press Working...Management & Safe Practices...Materials & Processes...Production Machining...Tooling & Dosign

HOW TO MACHINE STAINLESS STEEL WITH CUT-OFF TOOLS

By G. J. Stevens

As this machining engineer clearly explains, one of the most important tools used today in the production of stainless steel parts in screw machine and turret lathe operation is the cutoff or parting tool. Selection of the right type of tool material, grind and



operating techniques can well be the difference between high and low production output of a machine tool.

Page 108

HOW TO SOLVE YOUR SUPERVISORY PROBLEMS

By Alfred M. Cooper

In his contribution for this month, Mr. Cooper discusses the problems of health and well-being as they relate to the supervisor and executive and presents several methods and suggestions for meeting these problems effectively.

Page 114

A CASE OF CUTTING TOOL ANALYSIS

By C. W. S. Parsons

The author of the book "Estimating Machining Costs" provides a very comprehensive outline of how to figure a 27 percent reduction in the cost of a turret-lathe operation. Detailed cost breakdown tables accompany the text.

Page 116

this issue

JUNE 1959 . VOL. 32 . NO. 1

HOW TO INCREASE DIAL INDICATOR USEFULNESS

By Harold Sedlik

In this article, the author presents several designs of fixtures and attachments which have been found to increase dial indicator utility.

Page 134

TRACTOR REBUILDING COSTS CUT BY UNUSUAL WELDING PROCESS

By Gilbert C. Close

A company-built fully automatic welding machine with twin welding heads, designed especially for rebuilding worn crawler tractor track rollers and idlers, is saving customers of Kenweld Industries, Inc., Los Angeles, California, approximately 16 percent on this type of work and proving the styne of the style of t



this type of work and providing a wider margin of profit for the job shop itself.

Page 136

YOU MUST START TRAINING TOMORROW'S CRAFTSMEN TODAY

By Robert W. Burgess

An urgent need exists for better apprentice training programs if our industries intend to adequately meet the great future demand for skilled personnel, so says Mr. Burgess, who is chief engineer of the Griest Manufacturing Company, New Haven, Connecticut, a position he has held for ten years wherein he directs both tooling and the designing of products.

Page 144

NICHOLS - The Millers That Use Their Heads



STANDARD MODEL-A precise, versatile Hand Miller with Rise and Fall spindle. Table size 634" x 21".



TOOL ROOM MODEL - Large 81/2" x 30" table equipped with Micro Screw and Lever Feed Extremely accurate and adapt able.



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A call or card will bring the Erickson representative on the double. Meantim write for your copy of Catalog G "Erickson Quick Change Holders."

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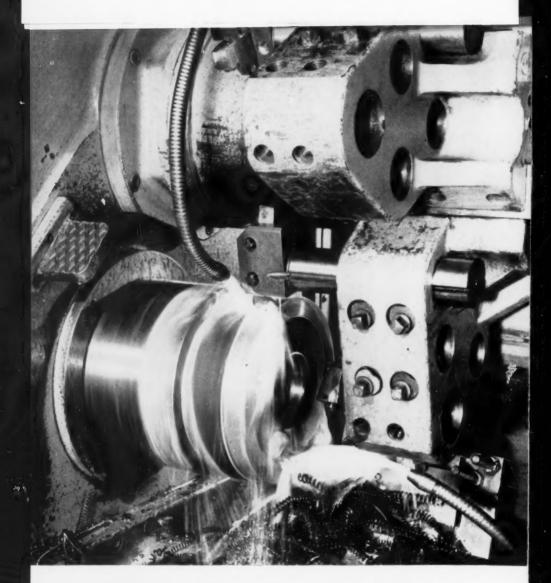
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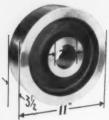
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SIX OPERATIONS WERE REDUCED TO THREE

Fairfield's old method on this part required drilling, round broaching, spline broaching and three turning operations. Now all operations except spline broaching are combined into two chuckings—one on each of two 3AC machines—handled simultaneously by one operator. The result—blanking costs dropped 42%. After spline broaching the blanks are ready for machining of gear teeth. Lot sizes average about 200 pieces with frequent runs of only 25 pieces.

Ot Fairfield Manufacturing Company

Lafayette, Indiana

GEAR BLANKING COSTS CUT IN HALF -even on Job Lotswith WARNER & SWASEY SINGLE SPINDLE CHUCKING AUTOMATICS

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To increase production and still keep costs in line, particularly on the smaller lots, greater machine tool versatility was needed. Method analyses revealed that any new production equipment under consideration should be more rigid for greater accuracy—capable of using the latest in carbides for faster metal removal—and permit combining of extra operations into single chuckings through more efficient tool setups and thus eliminate costly special tooling.

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- Power, speed and rigidity which allowed utilization of today's most advanced cutting tool materials to their fullest capabilities.
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- ★ Choice of 3 table and saddle devices for hole location.
- ★ 18" x 24" table—travel, 20" longitudinal; 15" cross.
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YOU'LL NEVER RUN



Boring accurate holes is one of many operations performed at low cost on the No. 1B or 1D Toolmaster.



(Photo courtesy Scottish Tool, Die and Metal Products Co., Cleveland 13, Ohio)

CINCINNATI TOOLMASTER MILLING MACHINES

Four styles available:

 $1A - \frac{3}{4}$ or 1 hp drive, manual feed to quill $1B - \frac{3}{4}$ or 1 hp drive, power feed to quill

1C - 2 hp drive, heavy duty head

1D - 11/2 hp drive, manual or power feed to quill



BUILDERS OF FINE MACHINE TOOLS: KNEE TYPE AND BED TYPE MILLING MACHINES . DIE SINKING MACHINES

THE CINCINNATI MILLING MACHINE CO., CINCINNATI

WORK for a

Cincinnati Toolmaster

If there's work in your shop, a Toolmaster can do it. Tool and die shops everywhere are finding that these machines handle an exceptionally wide variety of light duty vertical and angular milling operations, and drilling, boring and shaping operations as well. The Toolmaster is a favorite machine for many other reasons: the knee is extra wide and square gibbed; graduated dials are large and easy to read; oil-shot lubrication extends the productive life span of the machine; electrical controls are built-in; many attachments are available, including an 8" Index Head, built to Cincinnati's fine Dividing Head standards.

You will be highly pleased with Toolmasters' performance, their low price tag and big-machine features. Want more information? Write for copies of our attractive Toolmaster catalogs No. M-1870-4 and M-2017.



Smooth, accurate manual feed is a big help in milling the inside of box-shaped sections on the Toolmaster. Operator can work readily with two hands on controls while watching cutter.



Shaping Attachment adds shaping and slotting operations to the variety of Toolmaster jobs. Illustration shows how angular surfaces are shaped.

UTTER AND TOOL GRINDERS . ELECTRICAL DISCHARGE MACHINES

CINCINNATI

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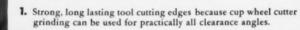
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Specify this

SUPER PRECISION, 1 HP, 3600 RPM
MOTORIZED TOOL AND CUTTER GRINDER
CLEARANCE ANGLE SWIVELLING HEAD WITH
ANGULAR ADJUSTMENT IN A VERTICAL PLANE





- Tooth rest stays on the center line of the cutter for practically all grinding on centers or in the work head.
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Ask us to send you complete specifications including price and delivery.



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No. 118



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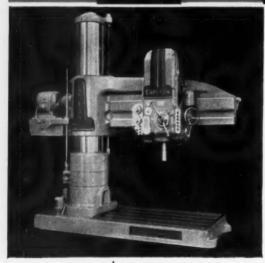
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Medel	Column	Arm lengths	No.	Range	No.	Range	Motor recommended
- AA	The state of the s	14	- 30	20 to 1	4	.866820	3-69
1A	9° 11°	3'-4' 3'-4'-5'	12	25 to 1		.006025	5-hp 5 er 7 tú-hp
a v	13' 35'	4.5 4.50 5.6.7	A R	100 m.l	Sent service	.004-129	716, 19, 15, 28 or 25-60
48	19"	6'-7'-8'	36	100 to 1	18	.004125°	15 to 40-hp
, SA	22"	7' to 10' . 8' to 12'	36	100 to 1	18	.804125°	20 to 40-lip†

*8, $11\frac{1}{2}$, 14 and 18 threads per inch are standard, with various other combinations available, \dagger Driving motor larger than 40 hp can be used if desired,

Carlton...the modern design radial drill

OA IA 3A 4A 5A



Carlton is the only radial drill to bring you all these advantages:

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Write for Bulletin CT-175 which has complete details on MARVEL High-Speed-Edge Hack Saw Blades.

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WITH NEW LODGE & SHIPLEY

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Now you can more quickly inspect drill jigs, lathe fixtures, gears, cams, splines, profiles, contours . . . and check many shop operations. You can easily set precision depths on drill presses, milling machines, jig borers, etc.

Write today for descriptive bulletin.



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For more data on advertisement on opposite page.

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Save 70% or more in tool costs and production time on holes over 5/8"

- Diameter adjustable within ¼ in. range: Blades are expandable as they wear for maximum tool life and accurate tolerance control. Grind blades for tolerance only; not for size.
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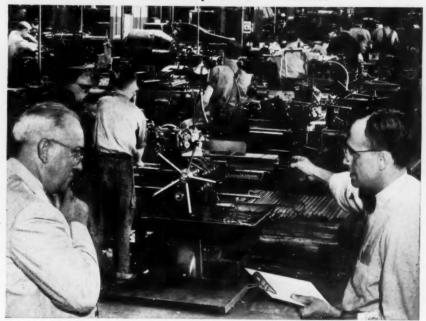


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Now you can buy them out of increased earnings

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Gisholt Machine Company



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controls for Full Magnetic Chuck performance

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A CHUCK CONTROL

Releases and demagnetizes work pieces simultaneously. No time lost. No damage to work or chuck face. Protects chuck from voltage surges. Speeds production. Chuck capacities: 50 to 15,000 Watts... 60 to 20,000 square inch chuck area.

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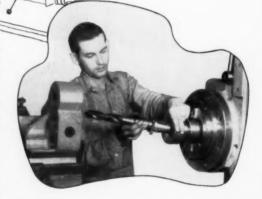
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which and there goes spindle accuracy

Our illustrated "character" is about to ruin spindle accuracy with a hammer and drift key that cost a lot of money to get in the first place. Modern P.D.Q. tooling can eliminate this abuse ... and save time and money as well. A quick one-sixth turn of the holder nut releases the adapter and you're ready for the next operation... it's as easy as that. How about those machine tools in your plant? Get the facts on P.D.Q. tooling... Write for complete information.



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modern machine shop

June, 1959

For more data on advertisement on opposite page, circle 329 on Postpaid Card

Your best buy in small surface grinders



Send for new catalog of Landis Abrasive Surface Grinders

ABRASIVE precision surface grinders

a product of

LANDIS TOOL

world's largest manufacturer of precision grinding machinery

WAYNESBORO, PENNSYLVANIA



BUSINESS IS UP

Get your share and keep it there!



Threadwell's fine line of cutting tools and gages is one guarantee of uninterrupted production, the surest

To get out front and stay there make sure you include your Threadwell Dis tributor in your production planning



THREADWELL TAP 4 DIE CO. GREENFIELD, MASSACHUSETTS

Stacking Warehouses: New York — Cleveland Detroit — Los Angeles — Greenfield, Mass.

For more data circle 331 on Postpaid Card









33 GREAT MAKES

with ONE big feature in common-

















A PARTNERSHIP IN PROGRESS

Air Speed



Your industrial supply distributor makes it his business to know your business. He is always available and ready to fill your needs quickly, dependably and economically. When you need chucks, you can depend upon Jacobs and the Jacobs industrial supply distributor who works with you... your partner in progress through service.

THE JACOBS MANUFACTURING COMPANY, WEST HARTFORD, CONNECTICUT For more data circle 332 on Postpaid Card

DIMENSIONAIR

THE AIR GAGE THAT MEASURES



Only air gage with builtin accuracy that enables use of one master.

- More Accurately
- More Dependably
- Faster (Greater Plug Clearance)
- · With less maintenance cost and with less dependence on Skilled Help . . . than any other air gage you can buy.

This is a statement we are ready to prove. Don't take our word for it. Try the Dimensionair on a nostrings-attached trial basis. For demonstration just write us: For catalog information just circle card.

FEDERAL PRODUCTS CORPORATION 9146 Eddy Street Providence 1, R. I.

FOR RECOMMENDATIONS IN MODERN GAGES Dial Indicating, Air, Electric, or Electronic - for Inspecting, Measuring, Sorti

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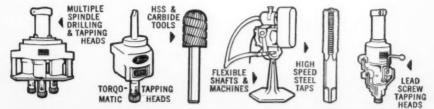
A complete line of High Speed Steel Taps, precision ground from the solid by Jarvis. Hand taps... machine screw taps...stub taps....pipe taps—Jarvis makes them all—plus special taps to meet unusual requirements.

Constant quality control at every stage of manufacture assures superior performance, longer tap life.

For expert advice on all tapping problems, Jarvis is always at your service.

A Jarvis representative is as near as your phone.

Send today for the Jarvis Tab Catalog listing all standard tap sizes and styles—plus complete tap data and tips for better tapping.



JARVIS CORPORATION • MIDDLETOWN, CONNECTICUT

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overrolling tap driver eliminates breakag

Now, increase protection against hard spots, poor lubrication, blind holes . . . in fact, almost every tapping condition that reduces efficiency or increases costs.

Scully-Jones "Safe-Torque" tap driver -with unique overrolling clutch-virtually eliminates tap breakage, reduces production costs by keeping machines on the job. In operation, the driver releases instantaneously and completely well below the tap's break strength. You avoid machine downtime due to breakage, eliminate costly scrap and rework. Torque is adjustable for different tap sizes and job condi-

> Quick - change type: three sizes from No. 10 to 1

Reversible type: from No. 2 1/4 in, tap range r.h. taps only.

tions. Once set, it remains constant no matter how often the driver releases. That's because there are no ratchet teeth. friction discs, or cones to heat up and change the torque setting. All contacting drive members roll on each other.

Your Scully-Jones representative or distributor can demonstrate the patented overrolling principle in a few minutes on your toughest tapping job. Find him in the yellow pages of your local directory, or call us direct: BIshop 7-5900.,

Scully-Jones and Company 1909 S. Rockwell St., Chicago 8, III. * Phone Bishop 7-5900



SAFE-TORQUE TAP DRIVERS

For more data circle 336 on Postpaid Card

in, tap range.





Literature, just off the press, covers features and specifications.

See our catalog in Sweets

PORTAGE...3" diameter horizontal milling, drilling and boring machine

Mr. Buyer...here's a 3 inch bar machine you can't afford not to investigate. It's new from the top of the column to the bottom of the base...All new speeds and feeds, plus a versatility of job applications make it a real money maker. All new construction features offer a truly strong, rugged machine...and the pay-off... it's priced amazingly low, every shop can afford one ...write, wire or phone for complete information.

THE PORTAGE MACHINE COMPANY



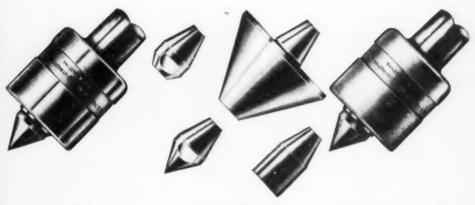
1025 SWEITZER AVE., AKRON II, OHIO PORTAGE 2-0211 TWX AK266

SUILDERS OF PRECISION MACHINE TOOLS, SPECIAL AND PRODUCTION MACHINERY SINCE 1816

For more data circle 337 on Postpaid Card

32 modern machine shop

June, 1959



Famous Perfection Grinding Live Center H.S.S. and Carbide Accurate Detachable Points Expansion Compensating
Lathe Centers

ANNOUNCING THE FIRST COMPLETE LINE OF PRECISION-BUILT LIVE CENTERS

INCLUDING 5 TYPES OF EXPANSION COMPENSATING CENTERS

- the only complete line
- the only guaranteed self-adjusting live center

INTRODUCING J & S Tool Company's complete new line of live centers with accuracy better than .0001", with these features:

- Guaranteed one year.
- Self-adjusting bearing take-up.
- RPM speeds up to capacity of present-day machines.
- Correct capacity rating.
- · Hardened and ground throughout.

Write today for a free copy of the J & S Live Center Catalog.

J & S TOOL CO., INC.

871 Dorsa Avenue

LIVINGSTON, NEW JERSEY

J & S TOOL CO., INC., ALSO MANUFACTURES FLUIDMOTION WHEEL DRESSERS CLAMPS • NO-BEND MILLING ARBORS AND CLAMPCUT MILLING VISES

For more data circle 376



15" DRILL PRESS



14" SUPER-HI SENSITIVE



14" DRILL PRESS



TOOLMAKER* GRINDER Surface, Chipbreaker, Tool & Cutter Also 6" Tool Grinder, 6" Bench Bed; Also Hand Screw Machine



7" GRINDER



11" METAL LATHE-4' and 5'

LTA INDUSTRIA

a proved way to cut

You can match the tool to your job for bigger savings-supplement or replace expensive, special-purpose machineswhen you choose from the world's most complete line-53 Delta machines, 246 models, over 1300 accessories. Delta tools cost less to buy, operate, and maintain. They offer precision performance to meet exacting requirements

even under rugged, production-line use.

And because you can combine standard Delta components with automatic control devices, you can have the money-saving advantages of automation at a fraction of the usual cost. Ask your Delta Dealer about Delta "lo-cost automation"-he's listed under "TOOLS" in the Yellow Pages.

J & S TOOL CO., INC., ALSO MANUFACTURES FLUIDMOTION WHEEL DRESSERS CLAMPS . NO-BEND MILLING ARBORS AND CLAMPCUT MILLING VISES

For more data circle 320



MULTIPLE SPINDLES



17" DRILL PRESS



20" DRILL PRESS



Also 14" and 20" Wood



14" METAL-WOOD BAND SAW 6" ABRASIVE BELT FINISHER CUT-OFF MACHINE Wet & Dry ● Also 12" Disc, 21/2" Belt Grinder ● Abrasive, Non-Ferrous & Wood



PRODUCTION TOOLS

metalworking costs

FREE-Delta Industrial Catalog ... Get all the facts on the complete line of Delta metalworking and woodworking tools and accessories. Write: Rockwell Manufacturing Company, Delta Power Tool Division, 606B N. Lexington Avenue, Pittsburgh 8, Pennsylvania.



DELTA INDUSTRIAL TOOLS



For more data circle 339 on Postpaid Card

Bbasic advantages of CINCINNATI®



Cincinnati® Hydraulic Press Brakes, now available in 300, 400, 500, and 600 ton capacities, are not substitutes for Cincinnati® Mechanical Press Brakes. Where high production, maximum accuracy, and greatly increased tonnage at the bottom of the stroke are required, Cincinnati Mechanical

Press Brakes remain unchallenged. However, where accuracy requirements are not extremely critical, where high speed is not necessary and where long strokes are desirable, Cincinnati Hydraulic Press Brakes offer important advantages—some entirely new to the field of hydraulic press brakes.

1 Accuracy

A special Cincinnati feature is extra heavy housings which extend above the cylinders, providing a means for their unique clevis mounting. This gives true centerline loading: vertical thrust of the cylinders is carried by the housings without welds or bolts. The cylinders are connected to the ram with ball joints and are self-aligning in all directions. Binding of pistons and ram slides cannot occur. In addition, deep beds and rams, and large radii at all stress points minimize deflection and insure maximum accuracy. With Cincinnati interlocked construction, the bed is supported directly by the housings without load bearing welds.

2 Convenience

All controls are at right end of the machine, within easy reach of the operator. The bottom stroke-stop adjusting crank is on the front of the bed. Micrometer registers are provided to indicate both the bottom stroke-stop and ram tilt adjustments, a great convenience in setting dies on initial or repeat setups. Tonnage, stroke length, and ram position are easily set. Indicator lights tell direction ram is moving or ready to move. Machine cannot overload: it reverses when loaded to any given tonnage setting.

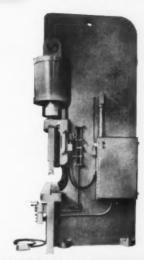
3 Economy

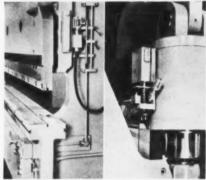
Greatly simplified maintenance and reduced cost result from Cincinnati's exclusive hydraulic manifold block, which brings valves and piping together in one compact assembly. The usual maze of valves, pipes and fittings is eliminated. High pressure joints are reduced to a minimum, which means important maintenance economies, year after year.

Write Dept. G for informative Bulletin HB-1.

Shapers / Shears / Press Brakes

THE CINCINNATI SHAPER ...

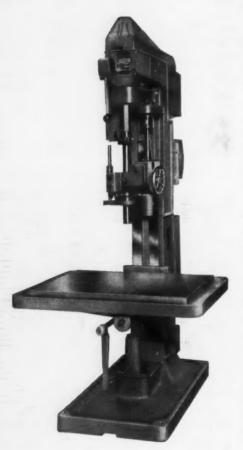








Cincinnati 11, Ohio, U.S.A.



automatic cycle drilling machine

You can chop your time costs with automatic set-ups on this new Avey machine, and still take advantage of the low cost and flexibility of a standard unit.

Adjustable rapid power traverse, feed, and rapid return of the spindle are the features which permit automatic transfer or rotary index fixturing.

At the same time, you get adjustable feeds, speeds, table travel, head travel, and Avey's advanced spindle construction.

The machine is available with No. 2, 3, and 4 Morse Taper; 1 to 3 HP motors; single or multiple spindles. Your request for additional information will be promptly answered. Avey Division, The Motch & Merryweather Machinery Co., Box 1264, Cincinnati 1, Ohio.

another first by



For more data circle 341 on Postpaid Card

modern machine shop

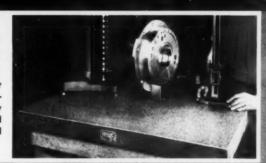
June, 1959

For more data on advertisement on opposite page, circle 342 on Postpaid Card

YOU KNOW IT'S ACCURATE

... when it's set up on a BRYANT GRANITE SURFACE PLATE

Patented, "head of the grain" finish for surface-wide wear resistance . . . unequalled true quartz granite with clearly defined flatness! Wide choice of standard and special sizes, available with welded steel stands.



... when it's checked on a BRYANT PRECISION THREAD GAGE

Bryant B-21 Bench Gage checks I.D. and O.D. threads in all tolerance classes to 5" dia., checks special grooves, snap ring or O-ring grooves, checks squareness of face (attachment illustrated) and concentricity of diameters—and does it 8 to 10 times faster!

Full complement of standard and special accessories makes the B-21 Bench Gage indispensable to product quality control.





FREE FACT-FOLDERS— Engineering data and prices on Bryant Thread and Groove Gages. Also —the full story of Bryant Surface Plates.



GREENVILLE PLANT, 945 E. SATER ST., GREENVILLE, OHIO

EX-CELL-O PRECISION PRODUCTS INCLUDE: MACHINE TOOLS + GRINDING AND BORING SPINDLES + CUTTING TOOLS + RALEROAD PINS AND BUSHINGS - DRILL JIG BUSHINGS TORQUE ACTUATORS - THREAD AND GROOVE GAGES - GRANTE SUBFACE PLATES AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS - DAIRY EQUIPMENT



THE DAKE HORIZONTAL INCLINED PRESS is recommended for work on jobs that are so big or heavy that it is more convenient to do press work while they remain suspended from an overhead crane or hoist.

For instance in the illustration above, a 7-inch shaft is being pressed into the cable drum for a 200-ton overhead traveling crane. The drum is 17 feet long and 4 feet in diameter. and is supported on a crane hook.

This particular press (Model 32-100) is 33 feet long overall, and has a daylight opening of 25 feet. It has 300 tons capacity, a 60° inclined frame, 26-inch stroke, and a ram-to-table distance from 25 inches to 25 feet. The table is moved along the frame with a hand winch.

Dake Hydraulic Presses are engineered to meet such a variety of shop requirements that the engineering is probably almost done on the press you need. Let us quote.

DAKE CORPORATION, 612 Robbins Road, Grand Haven, Michigan







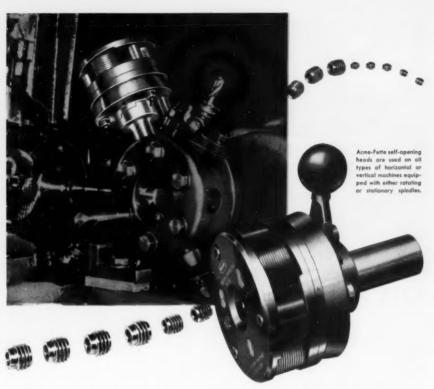








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Fasteners, Inc. completely eliminates crest cratering and seaming

...with ACME-FETTE Thread Rolling Heads

"Superior to any other method," say the customers of this Pittsfield, Massachusetts manufacturer of Kelox* threaded inserts. That's why they have profitably installed Acme-Fette thread rolling heads on existing turning equipment.

These precision heads generate the threads ahead of the rolls. This causes metal to flow to the full depth of the thread and eliminates broken grain structure and cratering at thread crest. The result is threads with a high grade burnished surface, remarkably resistant to abrasion, wear and corrosion.

Acme-Fette heads roll all parallel thread forms from 1/16" to 2" at speeds equal to turning

speeds with high speed steel tools...up to 5 times faster than conventional thread cutting. For cost-reducing ideas showing how you can put Acme-Fette heads to work on your present equipment, send for Bulletin NAF-57A.

National

Acme

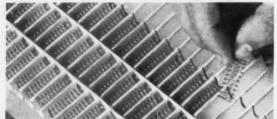
The National Acme Company 183 E. 131st Street Cleveland 8, Ohio

Sales Offices: Newark 2, N.J.; Chicago 6, III.; Datroit 27, Mich.

For more data circle 344 on Postpaid Card



NOW...eliminate tangling...



SAVE assembly time . . .





cut costs, speed operations with ... Spring Flow

Spring Flow brings springs, wire forms, and other fabricated metal parts into your plant packaged for efficient production. No need to waste time untangling - no distortion. Shape and finish are protected in use or storage. Inspection and selection is easier, faster. Special packaging or dispensing speeds up hand or automatic assembly.

Spring Flow cost is frequently offset by resulting savings. Here's how to find out. Show us your spring or metal part and how it is used in your plant. Let us submit a Spring Flow recommendation. Or write for booklet giving more details about Spring Flow.

Associated Spring Corporation

Wallace Barnes Division, Bristol, Conn. and Syracuse, N. Y. B.G.R Division, Plymouth and Ann Arbor, Mich. Gibson Division, Chicago 14, III.

Milwaukee Division, Milwaukee, Wis.

Canadian Subsidiary: Wallace Barnes Co., Ltd., Hamilton, Ont. and Montreal, Que. Puerto Rican Subsidiary: Associated Spring of Puerto Rico, Inc., Carolina, P.R.

Raymond Manufacturing Division, Corry, Penna. Ohio Division, Dayton, Ohio F. N. Manross and Sons Division, Bristol, Conn.

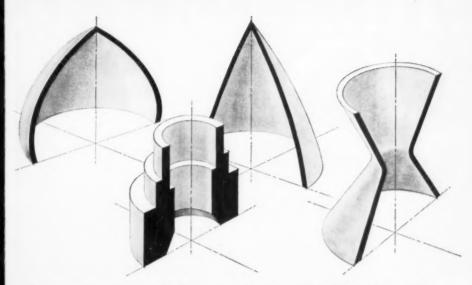
San Francisco Sales Office, Saratoga, Calif.

Seaboard Pacific Division, Gardena, Calif. Cleveland Sales Office, Cleveland, Ohio Dunbar Brothers Division, Bristol, Conn. Wallace Barnes Steel Division, Bristol, Conn.

General Offices: Bristol, Connecticut

For more data circle 345 on Postpaid Card

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how to Vertical Grind missile shapes

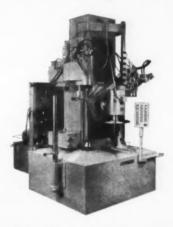
Complex missile shapes such as these, weighing hundreds or thousands of pounds, can be ground accurately on a Springfield vertical contour grinder. These machines are equally at home grinding ceramics, plastics, metals or combinations of materials. Domes (1) of any shape or Cones (2) demanding extreme concentricity can be contour ground on a Springfield. Ceramic coated parts (3) or complex orifices (4) are naturals for grinding on a standard Springfield vertical.

If your missile shapes, no matter what size, require contour grinding or have taper holes, irregular holes, offsets, undercuts or angles—we'd like to show you how the Springfield principle of vertical grinding can work for you. Mail the coupon today, for your free and informative copy of "Vertical Universal Grinders"; Bulletin 197-E.

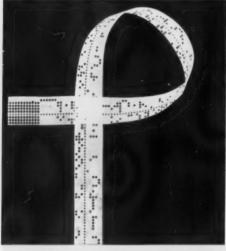
THE SPRINGFIELD MACHINE TOOL CO., SPRINGFIELD, OHIO





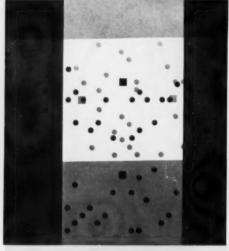


This machine accurately grinds a compoundcurve dome. Both the grinding wheel and a single point tool follow a precision template. Automatic parting tools remove excess stock, top and bottom.



1," 8-CHANNEL COMMUNICATIONS TAPE

Inexpensive, widely used throughout industry, these tapes may be prepared simply on a Flexowriter or similar equipment, usually by the Production Engineering Dept. Provides a typewritten record automatically for easy checking against pre-planned program.



4" MYLAR PLASTIC TAPE

Least expensive of the generally accepted tape systems, particularly suitable for smaller shops machining parts with relatively few holes. Tape can be prepared easily by shop personnel.

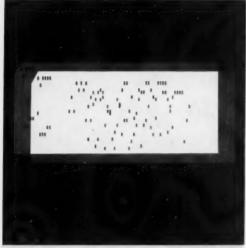






4" MYLAR PLASTIC TAPE

CONTROL



PUNCHED CARDS

This system can be integrated with card systems already in use by your company. Each job is programmed in a "deck" of cards; provides great flexibility, since an operation can be added or eliminated simply by making a new card or removing an old one.



PUNCHED CARDS

for Fosmatic JIG BORERS and JIG GRINDERS

Any tape or card reader can be used to control a Fosmatic Jig Borer or Jig Grinder. And because the functions of the standard Fosmatic are actuated electrically, numerical control can be installed in the field—economically!

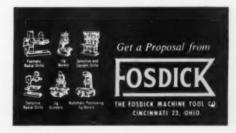
Speeds and feeds are changed by controlling electro-magnetic clutches through relay contacts. Table and saddle position is determined by a measuring system actuated by direct reading dials. For numerical control, these dials are driven by a fractional hp motor.

On a Fosmatic, you can program as many functions as you wish. Table X and Y positions (to .0001°), Feeds and Speeds, Spindle start and stop, Spindle feed start and stop, Spindle feed depth, Spindle head height, Automatic tool change. And only Fosmatic gives you a visual numerical check of coordinate location plus operation sequence number.

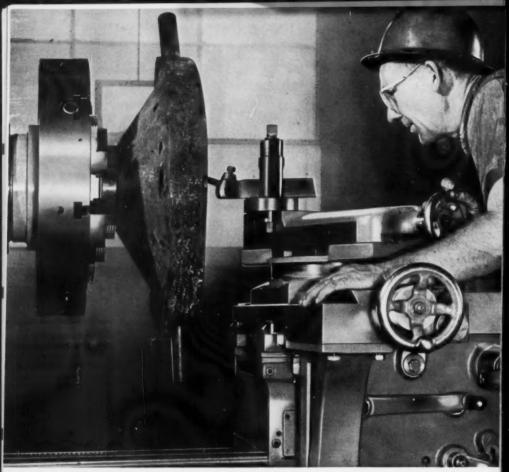
Example of savings made with Fosmatic numerical control. The illustration (left) shows one half of a mold with 900 cavities, each of which requires nine operations—a total of 8100! Time for the entire job was 100.25 hours, 25% of time consumed previously on a conventional jig borer.

Write or call today for complete information on a numerically controlled jig borer or jig grinder to improve your production method.

Buy a Fosmatic today — add Numerical Control tomorrow



For more data circle 347 on Postpaid Card



Operator machines \$1200 oblique-shaped, 31" diameter cross-head plate on Nebel extension bed gap lathe in half the usual time

Odd shapes to 40" dia. machined to .0004" in $\frac{1}{2}$ time on NEBEL extension bed gap lathe

The Port Arthur, Texas plant of Koppers Co., Inc., works with flammable gas under high pressures. Equipment maintenance demands perfect machining, with accuracy to four ten thousandths inches. The firm installed a Nebel extension bed gap lathe to obtain this precision, plus the extreme versatility necessary to swing large, odd-shaped parts.

The 28"/50" Nebel, with its 120" centers, 52" swing through the gap, and load-carrying capacity of over 37,000 pounds, satisfies Koppers' need for a "universal" unit. It has eliminated "shut-down time" in production, machining overnight pieces that previously required weeks of delay for replacement, being impossible to chuck or face on an ordinary lathe. Often, the machine "doubles" as an engine lathe.

Set up and geared for metric threading, from 1.75 to 80 threads per mm., offering precision impossible with competitive machines, the Nebel cuts machining time in half on most jobs, including Koppers special alloys.

Save time, money, space with accurate, flexible Nebel extension bed gap lathes. Write for bulletin.

CBEL LATHES

Nebel Machine Tool Corporation 3409 Central Parkway, Cincinnati 25, Ohio

U.S. Press Room Equipment

and Full Profit Profit

U. S. Press Room Equipment is designed for "F.P.P." — to help make press operations more profitable for you... to give to each press maximum flexibility and efficiency.

In many cases, press room productivity depends upon the flexibility of your equipment. The wider the range of material your presses can handle, the more productive and profitable they can be. When you combine this wider range of production with increased efficiency, you are approaching a production standard ideal for press rooms.

It is this standard — which has as its aim the realization of Full Press Room Profit for you — that dictates the manufacture and performance of every piece of U. S. Press Room Equipment.

For example, U. S. Slide Feeds are precision built units for the accurate feeding of coil stock into punch presses. They are adaptable to the feeding of one or more separate strips of wire or flat stock, either of regular or irregular cross section.

U. S. Flat Stock Straighteners and Two-Way Wire Straighteners are perfect complements to U. S. Slide Feeds. When teamed together they guarantee accuracy and contribute to prolonged die life.

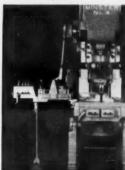
Write today for U. S. Bulletin No. 85S and learn how you can obtain maximum flexibility and efficiency for your present Press Room equipment — to give you your "F.P.P."

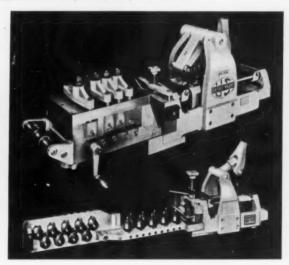


Some typical stock cross-sections readily accommodated by U. S. Slide Foods.

Below: SF-1 U. S. Slide Feed with SS-07 Plain Stock Straightener on conventional OBI press. Main Illustration Top: SF-68A U. S.

Main Illustration Top: SF-68A U. S. Slide Feed with SS-27 Plain Steck Straightener. Max. width capacity 6" feed length adjustable up to 8". Lower: SF-D U. S. Slide Feed with Two-Way Wire Straightener (nine rolls in each plane).





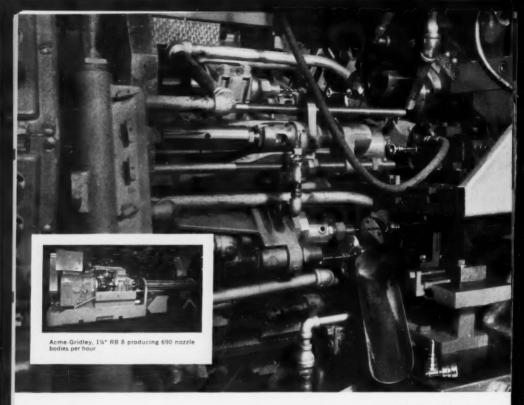


U.S. TOOL COMPANY, INC.

AMPERE (EAST ORANGE) NEW JERSEY

U. S. Multi-Slides® . U. S. Multi-Millers® . U. S. Automatic Press Room Equipment . U. S. Die Sets and Accessories

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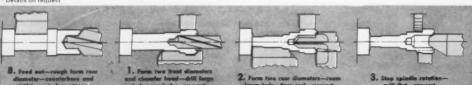
Close-up of tooling zone showing 5th, 6th and 7th positions.

ACME-GRIDLEY ELIMINATES SECONDARY OPERATIONS...

for Eagle Manufacturing Company

- Direct Cost Reduced 48%*
- Production Time Reduced 64%





NATIONAL ACME'S

INCLUDES ALL PHASES OF COST REDUCTION

Check YOURS... Then Check National Acme

Direct Costs: these include direct dollar savings as realized by the Eagle Manufacturing Company... an "every day" job for Acme-Gridleys.

Indirect Costs: effecting important savings in maintenance, downtime, scrap reduction, tool costs, etc.

Product Redesign: teaming with your design group to take full advantage of Acme-Gridleys' cost reducing capabilities.

Direct Material Costs: our engineers provide important savings in this area by constantly matching machines and tools to modern metallurgical problems.

Make-or-Buy Reviews: in many cases our Contract Division can assume your production headaches and relieve you of immediate capital investment.

Spot Modernization: pioneering in modern tooling methods, and the flexibility of Acme-Gridleys can provide many "on-the-spot" savings.

As a part of a continuing contribution to all phases of cost reduction, National Acme engineers initiated the development work necessary to effect important savings for this 65 year old Wellsburg, W. Virginia company.

The aluminum nozzle body of their hydraulic pump oilers formerly had been produced on a six spindle automatic and two other machines performing secondary operations. Visionary machine tool engineering made possible the application of spindle stopping and positioning on an eight-spindle Acme-Gridley to complete the entire piece in the primary set-up . . . and increase net production.

Advanced design and development such as this, together with wide open tooling zones, independently operated tool slides and the extreme accuracy and flexibility of direct camming . . . makes possible the solution of "unusual" jobs an "every day" occurrence at National Acme.

Write or ask one of our representatives for the complete story on the industry's most modern approach to *your* cost reduction problem.





4. Start spindle—

5. Roll conter throad—

7 comments belowed the



OLIVER Template Tool Bit Grinder

Duplicates Precisely in One Operation

That's right! The Oliver Template Tool Bit Grinder sharpens single point tungsten carbide, high speed and stellite turning tools . . . duplicating exactly all original flats and radii every time the tool is ground . . . in one simple, efficient grinding operation.

How is it done? Well, as you can see from the drawing above the answer lies in "template control." The template at the top of the specially designed tool holder is a twice size replica of the tool form being ground. The tool, securely held at mid-point in the holder, contacts the wheel and is ground until the template touches the template stop. In this manner, the tool is ground to the exact profile



of the template. The entire operation is performed in seconds easily, accurately on one machine . . . a machine that pays for itself by reducing your tool inventory and by eliminating lost production time and tool breakage.

Want proof? Oliver will grind your tools on a "no charge" basis. Write today for full information. We'd like the opportunity of sending you a quotation.

For more data circle 351 on Postpaid Card

OLIVER of ADRIAN

1430 E. Maumee St. . Adrian, Michigan

DRILL GRINDERS AND THINNERS-TOOL AND CUTTER GRINDERS-AUTOMATIC AND MANUAL FACE MILL GRINDERS-TOOL BIT GRINDERS-CONTOUR SAWING AND FILING MACHINES

How to add dividends to single point tools

The tool room can add four "dividend areas" through use of the Oliver 20" Template Tool Bit Grinder and can protect initial investment in tool bits. The dividends available to you are (a) rapid sharpening, (b) positive duplication, (c) grinding wheel economy and, (d) high salvage value.

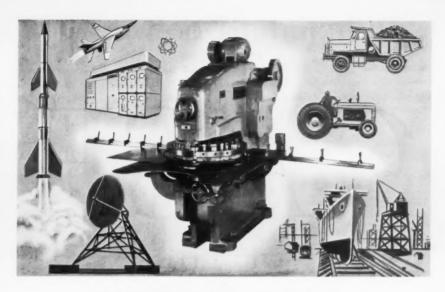


The total time involved in sharpening a tungsten carbide tipped tool bit is negligible. An average 34" square tool calling for a total stock removal of about 1/42" is sharpened completely in approximately 30 seconds. This includes all angles, radii and soft steel support.

Positive duplication is readily assured. Once your tool engineer has determined the proper shape and clearance for best results, it is important that there be no guess work on subsequent grinds. The Oliver template control insures such a grind.

Grinding wheel economy is extraordinary. Practically all users have found secondary diamond wheel finishing of carbide tipped tools completely unnecessary. The 20" diameter silicon carbide wheel produces a micro-finish almost equal to that ground with a diamond wheel.

Your tool bits can have a high salvage value. It is common practice to discard tool bits when the carbide contains an area which has broken out for a considerable distance. The removal of the damaged area is quite expensive by ordinary grinding methods. The Oliver Tool Bit Grinder permits the removal of 1/8" or 1/4" of carbide in a minute or two, thus giving you new tool performance once again at a very low cost.



WIEDEMANN PIERCES THE TIME AND COST BARRIER

Wherever openings must be produced in sheet metal or plate . . . and quantities range from one to hundreds of a kind. Wiedemann Turret Punch Presses are paying big dividends throughout industry. Direct savings of 60% to 90% are commonplace—here's why:

the WIEDEMANN METHOD

- . . . Eliminates These Costly Factors
- · layout and setup
- · burning, drilling, nibbling, fly cutting, etc.
- · deburring and cleaning
- · die sets and multiple tool setups

RA-AIP Winds 15-ton capacity

- . . . Gives you the unmatched Speed and Flexibility of a Turret Punch Press
- · Locates and produces openings accurately at low cost.
- · All tools in turrets ready for use.
- · Only one punch and die of a size required.
- · Engineering changes made on-the-spot.
- · Parts produced as required in minutes.
- · Simplifies design, engineering and production.
- · Pays for itself with savings in two years or less.



models from 4 to 150 tons

Take a closer look at your "hole" cost situation in terms of the Wiedemann Method. Send drawings of your work for time study and write for Bulletin 301.

GULPH ROAD . KING OF PRUSSIA, PA.

For more data circle 352 on Postpaid Card

June, 1959

modern machine shop

The CASE

OF THE

DISCERNING

LATHE BUYER



Which lathe did he buy and why?

For more data circle 353 on Postpaid Card

June, 1959

modern machine shop

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Mr. Elwood Brandenburg,

Factory Superintendent of the Liberty Tool & Die Corporation, Rochester, N. Y., recently made a buying decision. His company, a well known manufacturer of precision tools, dies and special machines, needed a 16" toolroom lathe for precision work. He wanted versatility, stamina, rigidity and operator convenience . . . and, like all of us, he wanted to make a good buy pricewise. Here's how he made his decision. Can you identify the machines?

The ones he rejected...



"Beautiful machine . . . but too many gadgets I won't use. Price too high."



"Same lathe as pre-War No improvements. Looks like our old machines."



"Only began making toolroom lathes since the War. Had none in the area to demonstrate."



"Meets specifications, but too light-weight and we felt that low price was not the best value."



"These people only make a 16" lathe now Can't help but wonder if they're going out of the lathe business."

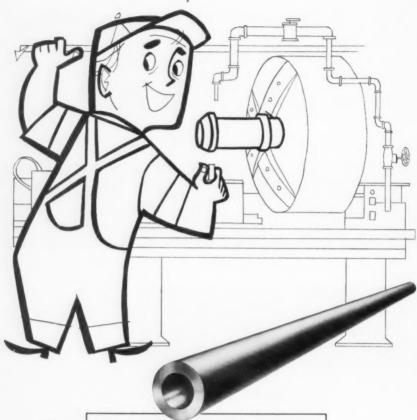
And the one he chose...



- "All things considered, 4 points won me over:
- 1. "Replaceable hardened tool steel bedways... can't help but feel safer knowing if anything would happen to these basic precision components, they can be quickly replaced as good as new."
- 2. "Compensating veeway bed design ... On some of my bigger machines the carriage always rides up off the ways when making a hogging cut. The compensating veeway design distributes forces so this can't happen."
- 3. "Two-speed tailstock . . . here's a feature that I can really use. It's espe-

- cially useful for drilling and makes set-up easier, eliminates the bull work."
- "New design headstock with compensating bearing enables us to use ceramic tooling."
- "Those were the facts that swayed me over, but there was one other thing... call it an 'intangible.' The salesman. Lathe F's representative honestly acted as though he would like to sell me a machine. He was helpful as he could be. He took me to a nearby plant to see his machine in operation. Then, when I asked for the old hard sell...he had all the answers. Yes sir, the salesman is a factor."

for Mr. Brandenburg's decision, turn to page 169



How

B&W JOB-MATCHED TUBING

speeds machining of precision parts

- ... Uniform close tolerances—require minimum machining to "clean-up."
- ... Controlled metallurgical structures—provide optimum machinability.
- ... Complete size range—permits choice of a tube size most appropriate for end use.

These are just a few reasons why it pays to specify B&W Job-Matched Seamless Mechanical Tubing for production of hollow precision parts.
Call your local B&W District Sales Office, or write for Bulletin TB-340 for full information. The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pa.



54

THE BABCOCK & WILCOX COMPANY

TUBULAR PRODUCTS DIVISION

Seamless and welded tubular products, solid extrusions, seamless welding fittings and forged steel flanges—in carbon, alloy and stainless steels and special metals

For more data circle 354 on Postpaid Card

modern machine shop

June, 1959







L Right & Left Hand High Speed Taps-Dies & Thread Plug Gages

SIZE	THREADS PER INCH	SIZE	THREADS PER INCH	SIZE	THREADS PER INCH	1 SIZE	THREADS PER INCH
0000	160	13/64	24-28-30-32-36-40	41/64	11-18-24	1-1/2	7-8-9-10-13-14-16-18-20-
100	120	7/32	20-22-24-26-27-28-30-32-	21/32	10-11-18-20-24-27-32-40		24-27-28-32-40
00	90-96-112		36-38-40	11/16	10-11-12-14-16-18-20-22-		7-12-18
)	56-64-72-76-80	.227	24		24-27-28-30-32-36-40	1-9/16	6-8-10-12-14-16-18-20-24-
1	48-56-60-64-80-90	15/64	20-22-24-28-36-40	23/32	11-12-16-18-20-27-32-36-40	1	32-40
2.	48-52-54-56-60-72-80	1/4	10-12-14-16-18-22-23-24-	47/64	10-12-16	1-5/8	5-512-6-8-10-1115-12-13-
3	36-40-60-64-72-80	1	25-26-27-30-32-36-38-40-	3/4	8-9-11-12-14-15-18-20-22-		14-16-18-20-24-28-32-40
4	30-32-38-42-44-56-60-64-		48-50-56-60-64-72-80		24-26-27-28-32-36-40	1-11-16	8-10-12-14-16-18-20-24-32
	72-80-90	17/64	12-18-20-24-27-28-32	49/64	10-16	1-23/32	5
5	22-27-30-32-36-38-42-48-	277	40	25/32	10-12-16-18-20-24-27-32-40	1-3/4	5-6-8-10-12-13-14-16-18-20
	50-56-60-64-72-80	9/32	16-18-20-24-26-27-28-32-	800	16		24-28-32-40
6	24-28-30-36-38-42-44-48-	19/64	36-40-46	13/16	8-10-12-14-16-18-20-24-27-	1.767	18
	56-60-64-72-80		18-24		28-32-40	1.7715	12
7	28-30-32-34-36-38-40-48-64	300	28 12-14-16-20-22-26-27-28-	.835	16	1-13.16	
8	24-26-28-30-38-40-44-48-	5/16	30-32-36-40-48-50-56-64	55/64	6-12	1-7/8	5-8-10-12-14-16-18-20-24-
	56-60-64-72-80	21/64		27/32	9-10-18-20-24-27-32-40-48		32
9	24-28-30-32-36-40	11/32	16-18-20-24-36 16-18-20-22-24-26-27-28-	.850	14	1-29/32	18-32
10	18-20-22-26-28-30-36-40-	11/32	32-36-40	7/8	8-10-11-12-13-16-18-20-24-	1-15/16	
	48-56-60-64-72-80				26-27-28-32-36-40	2	415-6-8-10-12-14-16-18-20-
11	20-22-24-28-30-32-36	23/64	16-24	29/32	9-12-14-20-24-27-28-32		24-28-32
12	20-22-26-27-30-32-36-38-	.365	28	15/16	8-9-10-12-14-16-18-20-24-	2-1/16	8-10-12-14-16-18-20-24-32
	40-48-56-60-64-72-80	3/8	12-14-18-20-22-26-27-28-	1.2.12	27-28-32-40	2-1/8	412-8-10-12-14-16-18-20
13	20-22-24-28-32	3.0	30-32-36-40-48-56-64	31/32	9-12-16-18-20-24-28-32	2-3/16	8-10-12-14-16-18-20-24
14	14-16-18-26-28-30-32-36-40	20.00		31134	5-9-10-11-12-16-18-20-24-	2-1/4	412-8-10-12-14-16-18-20-24
15	18-20-24-28-32 16-18-20-22-24-28-32-36	25/64	14-16-18-20-24-27	1.	26-27-28-30-32-36-40-48	2-5/16	8-10-12-14-16-18-20-24
17	16-18-20-22-24-28-32-36	.402	24			2-3/8	4-8-10-12-14-16-18-20-32
18	16-18-20-24-32-40	13 32	12-14-16-18-20-24-27-32-40	1-1/32	8-12-14-16-18-20	2-7/16	8-10-12-14-16-18-20
19	18-20	27/64	14-20-24-28-32-36	1-3/64	14	2-1/2	4-6-8-10-12-14-16-18-20
20	14-16-18-20-24-32			1-1/16	8-10-12-14-16-17-18-20-24-	2-9/16	8-10-12-14-16-18-20
22	16-18-20-24	7/16	10-12-16-18-22-24-26-27-		27-28-32-40	2-5/8	4-8-10-12-14-16-20
24	14-16-18-22-24		28-30-32-36-40-48-56	1-3/32	7-8-9-12-14-16-18-20-32		8-10-12-14-16-18-20
20 22 24 26	14-16-20-24	29 64	12-14-16-20			2-3/4	4-8-10-12-14-16-18-20-32
28	14-16-20	15/32	12-14-20-24-27-28-32-40	1-1/8	8-10-14-16-18-20-24-27-28-	2-7/8	4-8-10-12-14-16-18-20-24-
30	14-16-20	1/2	10-11-12-14-16-18-22-24-		32-40		32
1/16	56-60-64-72	11.4	26-27-28-30-32-36-40-48-	1-5/32	7-8-9-12-14-16-18-20-24-32	2-15/16	8-10-12-14-16-18-20-32
5/64	56-60-64-72	1	56	1-11/64	18	3	316-4-8-10-12-14-16-18-20
3/32	32-36-38-48-50-56-60-64	33/64	12-13-20-24	1-3.16	7-8-10-12-14-16-18-20-24-	3-1/8	4-8-10-12-14-16-20
.107	52			1-3:10	32-40		
7/64	36-40-42-44-48-50-56	17/32	10-12-13-14-16-18-20-24-	1		3-3/16	4-8-10-12-14-16-20
1/8	30-32-36-38-40-48-56-60-80		27-28-32-40	1+1/4	8-10-14-16-18-20-24-27-28-	3-1/4	4-8-10-11-12-14-16-18-20
.132	50	.550	24		32-40	3-3/8	4-8-10-12-16
9/64	30-32-38-40	9/16	10-13-14-16-20-24-26-27-	1-5/16	6-7-8-10-12-14-16-18-20-	3-1/2	
148	38		28-30-32-36-40-48	1	24-27-28-32-40-48		4-8-10-12-16
5/32	24-26-28-30-32-36-38-40-50	37/64	10-12-18-20-27	1-3/8	5-8-10-14-16-18-20-24-32-40	3-3/4	4-8-10-12-16 Many more
11/64	24-26-30-32-36-38-40	19/32	12-18-20-24-28-32-36-40	1-13/32		4	4-8-10-12-16 sizes in
1/16	12-18-20-22-24-26-27-28-					4-1/8	stock up
	30-32-36-40-48-56-64-72	5/8	9-10-12-13-14-16-20-24-26-	1-7/16	6-8-10-12-14-16-18-20-24-		
198	24	1	27-28-30-32-36-40-56	1	27-28-32-40	4-1/4	4-8-10-12-16

LEFT HAND N.C. (USS)-N.F. (SAE) SIZES

			SECTION.	Y PUR	MOKE 3	4.63	
SIZE	THREADS	SIZE	THREADS	SIZE	THREADS	SIZE	THREADS
0	80	8	32-36	7/16	14-20	1"	8-12-14
1	64-72	10	24-32	1/2	13-20	1-1/8	7-12
2	56-64	12	24-28	9/16	12-18	1-1/4	7-12
3	48-56	14	20-24	5/8	11-18	1-5/16	6-12
4	36-40-48	1/4	20-28	11/16	11-16	1-3/8	6-12
5	40-44	5/16	18-24	3/4	10-16	1-7/16	6-12
6	32.40	2.9	16.24	7.9	0.14	1.1/2	6.12

'OVERSIZE' and 'UNDERSIZE' TAPS

RIGHT AND	LEFT I	HAND	N.C. A	ND N	F.	SIZES	
MACHINE SCREW	#2 10	#5	Plus or	Minus		.003, .005,	.010
MACHINE SCREW	276 to	#14	Plus or	Minus		.002, .003,	.005
FRACTIONAL	1/4" to	1-1/2"	Plus or	Minus		.003, .005,	

Right & Left Hand-Unlisted

'Ge	in' or Spira	l Poi	nted Taps
Size	Threads 80 MF	Size	Threads
1	56 NS	7/8	9 NC, 14 NF
9/16	56 NC, 64 NF 12 NC, 18 NF		NC, 12-14 NF
5/8	11 NC, 18 NF	5 3 /4	7 NC, 12 N
11/16	11 NS, 16 NS	1-3/8	6 NC, 12 NF

		Length	Taps
se T	hreads	Size	Threads
36-40 N	C, 48 N	7/16	24 NF
32 N	C, 40 N	1/2	20 NF
	C, 36 NI C, 32 N	9/16	18 NF
	C, 28 HI	5/8	18 NF
4	28 NF	Also La	rger
16	24 NE	Sives	NC & NE

		UNL	ISTED		
Ri	ght h	land	"Pip	e" T	aps
"N	PT"	**	4PS"		ENGTHS
Taper	"NPT"	Size	Thread	TOM	PT" &
Size	Thread	1/16	27		1957
1/16	27	1		Size	Thread
1/4	27	1-1/4	1115		
2-1/2		1-1/2	1152	1/16	27
4-1-4		2	1112	1/8	27
3	- 8	2-1/2		1/4	18
3-1/2		3		3/8	18
3-11-5	-	3-1/2		1/2	14
4		4	8	3/4	14
Also	British.	Also	British	1	1112

	thand ' per and		
Size	Thread	Size	Thread
1/16	27	1	1115
1/8	27	1-1/4	1115
1/4	18	1-1/2	1115
3/8	18	2	1115
1/2	14	2-1/2	8

The Largest Stock of Special and Standard Taps, Dies, Plug Gages

SPECIAL RING GAGES

IF NOT IN STOCK 2 WEEKS DELIVERY

ACME TAPS IN STOCK

IF NOT IN STOCK-7 to 10 DAYS DELIVERY-When ordering or requesting quotations, kindly furnish following information:

- (a) Kind of material being machined.
 (b) Deph of hele, through or bettem.
 (c) Deph of hele, through or bettem.
 (d) Will tap turn, or is piece appected to be turned.
 (e) Is tapping job expected to be done in one pass.
 (ii) Would tap be backed out of hele, or machine stopped for release

submit thread length, and overall length of tap

SPECIAL REAMERS Immediate Delivery

14 2-1/2

H.S.S.S. Machine Reamers Decimal, Fractional, Letter. and Wire Gauge Sixes Prices On Application

SPECIAL-Right Hand High Spec EXTRA LENGTH DRILLS In Stock for Immediate Delivery

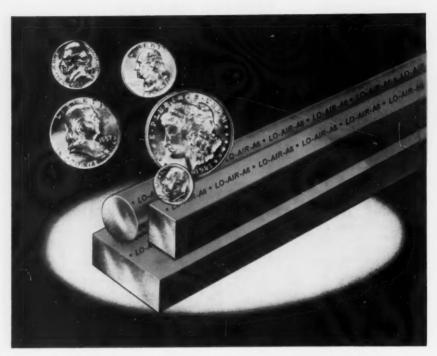
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You always get more for your money at . .

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THERE'S A BONUS IN EVERY BAR

LO-A R TOOL and DIE STEEL Gives You 4-Way Savings on Every Job

There's 75 years experience in specialty steels behind LO-AIR, Universal-Cyclops low temperature, air hardening tool and die steel. LO-AIR is remarkably free from distortion in hardening, sets new standards for machinability.

Check these four ways that LO-AIR can save you money, help you make more profit.

- Excellent machinability—far easier than other air hardening grades of tool steels.
 Easier than oil hardening tool steel.
- 2. Can be hardened in the low temperature

furnace-no need to pay the high cost of high temperature hardening.

- 3. Less distortion during hardening, which reduces your finishing costs.
- 4. Maximum safety-possibility of cracking during hardening greatly reduced.

Write for brochure No. TS-101, or start your bonus savings now by ordering your requirements from your nearest Universal-Cyclops sales office or warehouse today! Complete stocks -rounds, flats, squares and billets-available for immediate delivery.

U.S. Pat. No. 2,355,224

CORPORATION

BRIDGEVILLE, PA.

TOOL STEELS . STAINLESS STEELS . HIGH TEMPERATURE METALS

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NEW

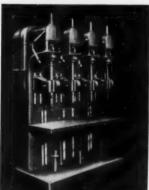
"BUFFALO" NO. 3A R-P-MSTER WITH 2" CAPACITY AND TORQUE-CONTROLLED FEED!

The new "Buffalo" No. 3A R-P-Mster brings you a higher rated capacity of 2" in mild steel. Also new is the exclusive "Buffalo" Torque-Controlled Power Feed. Now you can safely use maximum speed and feed for the size hole being drilled. Danger of overloading the machine is positively eliminated by the torque control on the feed shaft.

Moderate price makes the new "Buffalo" No. 3A R-P-Mster your best variable speed drilling machine buy. To really appreciate it you must operate it yourself. "1001" speeds, easily and quickly changed. Extreme accuracy, smoothness, quiet operation. Ruggedly built for long life with minimum maintenance.

Phone your "Buffalo" machine tool dealer today for a demonstration, or mail coupon to us.





BUFFALO FORGE COMPANY

388 Broadway

Buffalo, N. Y.

Please send me complete facts on new "Buffalo" No. 3A R-P-Mster.

(Name and Title)

(Company)

(Street Address)

(City)

(Zone)

(State)

For more data circle 357 on Postpaid Card

June, 1959

modern machine shop

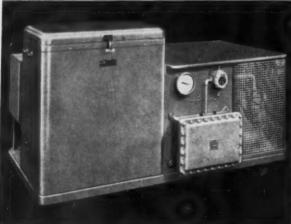
57

CHOOSE THE PIONEER

CINCINNATI SUB-ZERO PRODUCTION and CHILLING EQUIPMENT

For 20 years we have been building low temperature testing and storage units. As the most experienced manufacturer in the field today, we take pride in our record for 100% reliability...and for building a little more into every unit produced.





Member: Environmental Equipment Institute

Production chilling of stabilizing shafts utilizes this Cincinnati Sub-Zero unit, with temperature range of —70 to —150°. Chills 150 lbs. of steel hourly ... 4000 BTU/hr at —120°F.

Write today for fullline catalog. Or describe your requirements so our Engineering Department can submit recommendations.



CINCINNATI SUB-ZERO PRODUCTS

General Office & Plant

3930-\$-9 Reading Road • Cincinnati 29, Ohio
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HERE IS QUALITY AT A SENSIBLE PRICE

the CLEARING-HARRISON

11" MODEL JUST \$1,950"

II CLEARING

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Lat Aggreg and here first

Not only does the Clearing-Harrison look like a lathe that should cost 50% more than its list price, it performs that way. And it will continue to perform year after year as only a fine machine tool built to uncompromisingly high standards of precision can.

It has taper roller bearings in the spindle, hardened and ground ways, precision hobbed, heat treated nickel chrome gears. A removable section in the bed provides a gap giving a maximum swing of 18½ on this 11' lathe. These and other fine features are found only in the Clearing-Harrison—sold and backed by Clearing division of U.S. Industries, Inc.

Delivery is immediate on this and on 13" and 16" lathes, too. Find out more about these and the many other benefits you get on the Clearing-Harrison. Write Clearing for details.

Clearing, division of U. S. Industries, Inc., also manufactures the Clearing-Axelson line of engine lathes, power presses of all types, dies and special tooling, and special equipment for the aircraft and missiles industry.



• 13" Swing \$2,960



● 16" Swing \$4,450

Also available with factory-built copying attachments.

Coast to Coast Service Facilities

Clearing's nationwide facilities assure you of prompt service always. Replacement parts and accessories are stocked at Clearing and are available through all three plants, at all service centers and through all Clearing dealers.





DIVISION OF U.S. INDUSTRIES, INC.

6499 W. 65th Street • Chicago 38, Illinois
Plants in: Chicago, III. • Namilton, Ohio • Los Angeles, Calif.

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A Lot More

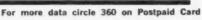




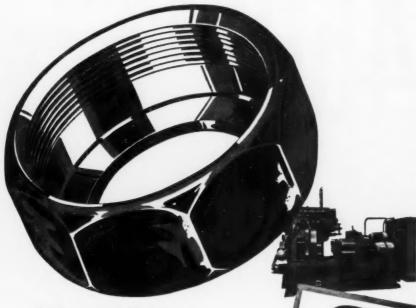
11/2 HP Head or optional 2 HP with continuous duty motor gives 50% or more capacity . . . More rigidity, more accuracy . . . Increased horse power and dynamically balanced Cast Iron Pulleys and Drive System afford improved production capacity . . . More weight in the column, heavier ribbed column, heavier knee, heavier saddle.

Unique square design of overarm affords more rigidity, greater accuracy . . . Provides extra range and capacity . . . More power at the cutter. No adjustment required on overarm and head after use ... No need to re-indicate head after moving overarm . . . Speed range with nine changes makes possible the use of high speed or carbide tipped cutters to best advantage.

N. MECHANIC ST.,



... an example of Automatic Production by Greenlee ...



700 malleable iron pipe fittings an hour...

The Greenlee 5 station, horizontal, automatic indexing machine shown above was designed and built for high-production machining of malleable iron pipe fittings. The pipe fittings are loaded, four at a time, indexed and machined at the rate of 576 to 712 pieces an hour, depending on size.

The machine accommodates five different sizes of fittings.

STATION 1 - automatic load

STATION 2 - bore and rough counter-bore

STATION 3 - finish counter-bore and chamfer

STATION 4-tap

STATION 5 - automatic unload

Let a Greenlee representative show you the modern Greenlee approach to automatic production.

MACHINES DESIGNED . . . WITH THE FUTURE IN MIND

MACHINES

GREENLEE STANDARD AND SPECIAL MACHINE TOOLS

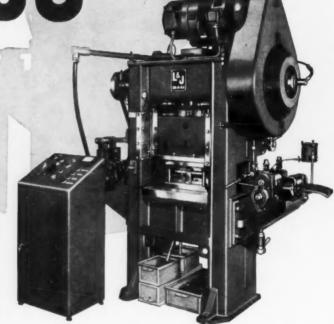
- Multiple-Spindle Drilling and Tapping.
- Six and Four-Spindle Automatic Bar Machines
- Hydro-Borer
- Precision Boring Units Die Casting Machines
- Trim Presses

GREENLEE BROS. & co.

1704 MASON AVE. ROCKFORD, ILLINOIS

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S.P.M. to keep production costs down



DOUBLE CRANK STRAIGHT SIDE PRESS

Here's new life for lagging production—speeds up to 450 strokes per minute to give you new highs in the output of small precision parts. Designed primarly for use with progressive dies, this versatile 20 ton press gives you everything you need—speed—accuracy—big capacity—long die life—ease of set-up. It pays off in lower production costs.

Also, Single and Double Crank Straight Side Presses up to 150 ton, Gap Frame Presses 30 to 75 ton, O.B.I. Presses 14 to 90 ton. Write!

L&J PRESS CORPORATION

1624 STERLING AVE. ELKHART, IND.

For more data circle 362 on Postpaid Card



You can cut the time required to open and close fixtures by a third or more with the Bellows HAN-D-AIR cylinder. These small, compact 1-1/8" bore air cylinders develop 80-to-100 lbs. of thrust at average shop air pressures. They are easy to install on many standard fixtures and readily incorporated into special fixtures. They are so low in cost it's easier to leave them permanently on the fixture than to transfer them from one fixture to another.

Bellows HAN-D-AIR cylinders are available in 1, 2, 3 and 4" stroke lengths, in both single and double acting types. Can be mounted in any position. The 5/16" dia. piston rod is threaded for easier installation.

Write for information and prices on the Bellows Han-D-Air Cylinder. Address Dept. MMS659, The Bellows Co., Akron 9, Ohio. In Canada: Bellows Pneumatic Devices of Canada, Ltd., Toronto, Ontario. 895-B

The Bellows Co.
DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION
AKRON 9, OHIO

For more data circle 363 on Postpaid Card

STANDARD BROACHES from STOCK

Minute Man KEYWAY BROACH KIT



In one minute and for as little as one cent you can cut a keyway with the Minute Man Keyway Broach Kit. For keyways from $\frac{1}{16}$ " to 1" in any bore from $\frac{1}{16}$ " to 3".

SAVE TIME AND MONEY
WITH THESE OTHER STANDARD
STOCK BROACHES

SQUARE BROACHES — 1/8" to 3/4" holes

HEXAGON BROACHES - 1/8" to 3/4" holes



ROUND BROACHES — 1/4" to 1" holes

SEND FOR CATALOG
AND PRICE LIST



The duMont Corp. Greenfield, Mass.

MAIL FREE BROACH CATALOG AND PRICE LIST S describing Square Broaches, Hexagon Broaches, Production Type Keyway Broaches and Keyway Broach Kits to

Name.....

Company.....

duMont

For more data circle 364 on Postpaid Card

Meetings

Important Meeting Dates

JUNE 9-12 • Material Handling Institute Inc., National Exposition of Material Handling Equipment, Public Auditorium, Cleveland. Institute headquarters: 1 Gateway Center, Pittsburgh 22, Pennsylvania.

JUNE 14-17 • National Association of Purchasing Agents, Annual Meeting and Exhibit, Waldorf-Astoria Hotel, New York. Association headquarters: 11 Park Place, New York 7, New York.

JUNE 14-17 • National Industrial Advertisers Association, Annual Meeting, Fairmont and Mark Hopkins Hotels, San Francisco. Association headquarters: 271 Madison Ave., New York 16, New York

JUNE 14-18 * American Society of Mechanical Engineers, Semi-Annual Meeting, Chase-Park Plaza Hotel, St. Louis. Society headquarters: 29 W. 39th St., New York 18. New York.

JUNE 14-19 • Society of Automotive Engineers, Summer Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J. Society headquarters: 485 Lexington Ave., New York 17, New York.

JUNE 15-19 • American Electroplaters Society, Annual Meeting and Industrial Finishing Exposition, Statler-Hilton and Sheraton-Cadillac Hotels, and Detroit Artillery Armory, Detroit. Society headquarters: 445 Broad St., Newark 2, New Jersey.

JUNE 21-23 • Alloy Casting Institute, Annual Meeting, Homestead Hotel, Hot Springs, Va. Institute headquarters: 286 Old Country Rd., Mineola, New York.

JUNE 21-26 • American Society for Testing Materials, Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J. Society headquarters: 1916 Race St., Philadelphia 3, Pennsylvania.

JUNE 22-27 • American Institute of Electrical Engineers, Summer Meeting, Buffalo. Institute headquarters: 33 W. 39th St., New York 18, New York.

CHUCKING METHODS CAN BECOME OBSOLETE TOO!

retool with Cushman

AIR OPERATED CHUCKS



Designed and built to fully meet modern machining techniques and machine tool requirements, Cushman Chucks permit the use of higher speeds with heavier feeds, maintaining closer tolerances with continued repetitive accuracy and result in maximum workholding afficiency with the greatest savings in time and costs.

For profitable machining through the use of precision chucking equipment, specify Cushman Air Operated Chucks.

Write for Bulletin PO-660.

CUSHMAN CHUCKS,
a product of American quality,
labor and materials.

THE CUSHMAN SHUCK COMPANY MARREOD B. COMI.

Sold through your industrial distributor.

your Norton Man
for the latest

facts on Carbide grinding



Magnified View of a man-made diamond. The extremely jagged surface provides a large, tight-holding contact area for bonding. In the new Norton SD* wheels this extra gripping power, teamed with advancements in diamond wheel construction, reduces diamond loss and carbide loading to a minimum - typical of Norton leadership in getting the maximum working power out of all diamonds, mined or man-made.

NORTON PRODUCTS: Abrasives . Grinding Wheels . Grinding Machines . Refractories . Electro

with Norton wheels

using mined or man-made diamonds

Norton diamond wheels — the most complete line for carbide grinding — are backed by pioneering never equalled, whether the diamonds used are mined or man-made.

Norton began its leadership in diamond wheel development back in 1930 ... introduced all three bond types ... does all its own sizing and checking of diamonds ... duplicates wheel specifications with constant accuracy.

Norton leadership continues with the use of man-made diamonds. These newest diamonds last longer for many carbide grinding operations because they are more firmly anchored in the bond... and because their greater friability presents new cutting edges faster, decreasing power requirements and speeding cutting action.

Man-made diamonds are used to fullest advantage in the new Norton SD* wheels — proved in more than a year of nation-wide, comparative testing . . . In

63% of hundreds of field tests the average service life of Norton SD* diamond wheels was at least 25% longer than the life of wheels using natural, mined diamonds.

With each Norton diamond wheel, of mined or man-made diamonds, you get a certificate of the accuracy of diamond concentration. You can depend on this certificate to mean exactly what it says.

You can depend on your Norton Man, too. This expert Abrasive Engineer can show you how to get better grinding quality, longer service life and lower cost grinding for every dollar you spend on diamond wheels. NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

*SD = Man-made diamonds

W-1916



Making better products . . . to make your products better

BEHR-MANNING DIVISION: Coated Abrasives - Sharpening Stones - Pressure-Sensitive Tapes

For more data circle 366 on Postpaid Card

June, 1959

modern machine shop

67

Produced by

for long-run dies ...













Fully-Uniform . . .

Free-Machining

DESEGATIZED®

OLYMPIC FM

High Alloy Die Steel

When your die production calls for long-run service . . . and you need a die steel that yields a superior machine finish without tearing-one that has excellent non-deforming characteristics in heat treatment . . . that's the time to use Latrobe's OLYMPIC FM.

OLYMPIC FM is an air hardening 12% chromium (D-2 type) die steel made to exacting standards by Latrobe Metalmasters . . . guaranteed to be fully-uniform in the distribution of wear-resisting carbide particles and allov sulphides for better machinability . . . a result of Latrobe's exclusive DESEGATIZED* process of manufacture!

There's a wide range of Olympic FM sizes stocked at branch warehouses near you-Call



68

Or send for Olympic FM Data Sheet today!

LATROBE STEEL COMPANY

MAIN OFFICE and PLANT: LATROBE, PENNSYLVANIA BRANCH OFFICES and WAREHOUSES:

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For more data circle 367 on Postpaid Card

STEELWELD SHEAR Serves TOUGH JOBS Well



FOR several years a Steelweld Shear has been in operation at the Drake Steel Supply Co., Los Angeles, California. Most of the time it has been worked on a 16-hour-a-day schedule. It is used for a wide variety of shearing, mostly on %s-inch and %-inch steel plate.

The machine has proven itself on all sorts of shearing jobs. A particularly tough one was the cutting of 120,000 small odd-shaped gusset plates. These were of three sizes and cut three to six at a time of ½-inch steel. The work jarred the shear terrifically, but because of its heavy construc-

tion, did not affect it in any way.

Considering the volume of work and hard service, the knives hold up very well. They need be turned only about once every six months.

Write for free capy of catalog No. 2011

Mechanical and Hydraulic SHEARS SLADE

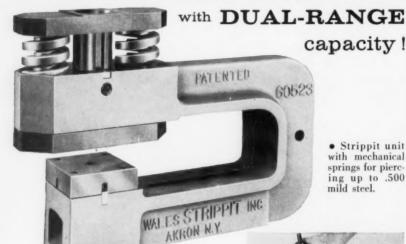


Steehweld Machinery Includes: Machanical & Hydraulic Steens and Press Brakes, One-, Two- and Four-Point Straight-Side Presses, Speed-Draw Presses.

THE CLEVELAND CRANE & ENGINEERING CO.

6458 E. 282nd St., Wickliffe, Ohio For more data circle 368 on Postpaid Card

new STRIPPIT PUNCHING UNITS



· Strippit unit with mechanical springs for piercing up to .500 mild steel.

- Up to .500 mild steel, using removable Strippit mechanical springs
- Up to .750 mild steel, with interchangeable Strippit Hydra-Springs
- Convertible from .500 to .750 capacity in seconds, at minimum cost
- One heavy-duty holder for both capacity ranges
- Readily replaceable punch tips and dies round, obround, square, shaped
- Keyed punch body keeps punches accurately aligned

· Mechanical springs are easily replaced with Hydra-Springs for punching up to .750 mild steel.

USING STRIPPIT MECHANICAL SPRINGS

Max. punch dia.	Max. material thickness (mild steel)
1.375	.250
1.250	.375
1.125	.500

USING STRIPPIT HYDRA-SPRINGS

Max. punch dia.	Max. material thickness (mild steel)
1.375	.375
1.250	.500
1.125	.625
1.000	.750

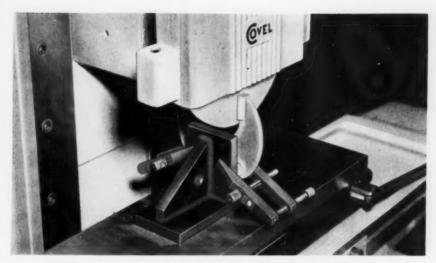
WRITE TODAY for new Strippit General Catalog. Covers all Strippit units ... plus savings effected with famous cost-cutting Strippit System of fabrication.

WALES STRIPPITING. HOUDALL

207 Buell Road, Akron, New York



Manufactured in Canada by: Strippit Tool & Machine Company, Brampton, Ontario For more data circle 369 on Postpaid Card

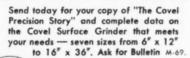


This is not an <u>ordinary</u> surface grinder at work...

It's a Covel No. 10—built to do MICRO-PRECISION work on accurate snap gages like this. And it also does a top-notch grinding job on other tool room work such as form tools, jigs and dies—day after day and year after year to save you money. Covel pioneered with hard chrome table ways that keep this 6" x 18" machine in top position in the tool room grinder line-up far longer than grinders with ordinary ways. Covel-developed smooth timing belt table drive, hardened and ground lead screws and rigid vertical slide are among other outstanding features that add up to long-lived Covel MICRO-PRECISION performance.

First with hard chrome table ways...

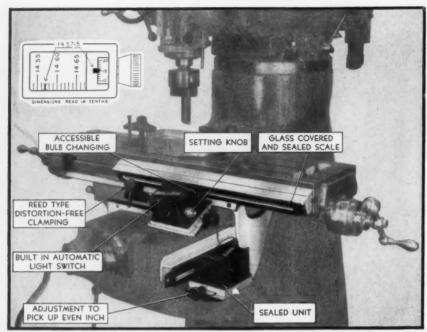
Micro-Precision a Covel Tradition-Since 1874







For more data circle 370 on Postpaid Card



The New Bridgebort OPTICAL SYSTEM

. . . fast, accurate and efficient

By using the NEW BRIDGEPORT Optical System it is now possible to read a figure on the scale as it appears on the working drawing. It is not necessary to add any figures or make any vernier estimations. The operator's skill in reading a single line is all that is required.

The new BRIDGEPORT Optical System is an accurate and time-saving method for quick positioning of table in both planes.

The Optical System is installed at factory on new machines and is easily installed in the field on any BRIDGEPORT MILLER already in service.

Further facts are available through your nearest dealer or through us direct.

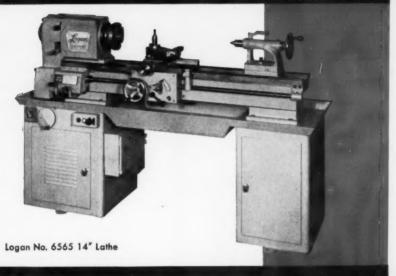


For more data circle 371 on Postpaid Card

its specifications add up

to high production capacity

Logán 14"Lathe



Logan designs greater reliability and accuracy, and longer life into its lathes by a generous combination of high-capacity features. For instance—

- An oversize spindle with 150" bore turns on four superprecision ball bearings with built-in preload
- A variable-speed drive lets you change speed while work is turning—without shifting belts
- A warp-free lathe bed with high, strong walls braced by oversize ribs to withstand heaviest stresses; two V-ways and two flat ways are flame-hardened and precision-ground.

There are many more reasons why this and other Logan Lathes have a greater capacity. The complete specifications tell the story. Write for them.

- Spindle speeds to 2000 rpm
- 1½" Levermatic collet chuck capacity
- 1458" swing over bed
- 9" swing over saddle cross slide
- 40" between centers

LOGAN ENGINEERING CO. Dept. 1-659, 4901 Lawrence Avenue, Chicago 30, Illinois For more data circle 372 on Postpaid Card

NEW Electric Furnaces built for your specific needs!

THERMOLYNE TYPE 2100

for small parts and short runs

- Top-loading
- 6¾" dia. x 11" deep chamber
- 61/2" x 71/2" stainless steel pot
- Triple-insulated



This low-cost, multipurpose THERMOLYNE Type 2100 Furnace is adaptable for use as solt bath, melting, vertical muffle or crucible furnace. Basic unit includes furnace, alloy pot and cover with lifting handle, and thermocouple in protection tube. Optional maximum-use accessories include refractory ladle and refractory liner with cover. Three types of insulation hold heat loss to a minimum. For continuous operation, maximum chamber temperature is 1650° F; for intermittent use, 1900° F. Automatic or semi-automatic electronic temperature controls available. 115 or 230 volts. Price of basic unit, without controls, \$180.00.

TEMCO TYPE 1900

for long work parts and high temperatures

There's no waste space in this new TEMCO Type 1900 Furnace with the chamber long in relation to its height and depth. Choice of 2000° or 2300° F maximum operating temperature, 115 or 230 V. Gives fast heating, quick recovery time, and big power reserve for heavy loads. Available with wide selection of control instruments. Price (furnace only) \$215 or \$235, according to temperature range.



- Chamber dimensions: 13¹/₄" deep,
 4-3/16" high, 4-7/16" wide
- Reinforced, welded steel shell
- Easily operated door.

Write for information and name of nearest dealer

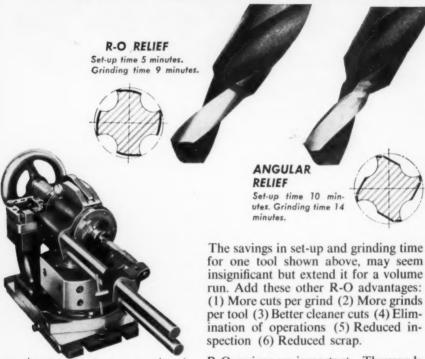
THERMO ELECTRIC MANUFACTURING CO.

488 Huff St., Dubuque, lowa For more data circle 373 on Postpaid Card

74 modern machine shop

June, 1959

Are you SHARPENING them or GRINDING AWAY their life?



COMBINATION

ination of operations (5) Reduced in-R-O savings are important—Thousands of users across the country will attest to this.



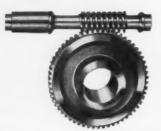
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City							Zo	ne		S	tat	e.					4
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For more data circle 374 on Postpaid Card

RADIAL BELIEF







YOU write the specifications

Our job is to furnish Adams Gears exactly as you want them. Each step of gear manufacture is carefully controlled to assure lasting service and utmost satisfaction.

Send your inquiries to The Adams Company, 1942 Cypress St., Dubuque, Iowa.



The ADAMS Company

Dubuque, Iowa, U. S. A.

ESTABLISHED 1883

Gears made to your exact specifications

For more data circle 375 on Postpaid Card





A PRODUCT OF SKILL

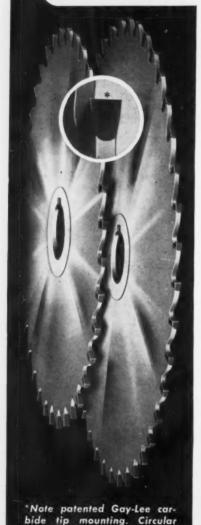
100% INSPECTED TOOLS

the complete line

Expertly-made Butterfield end mills, reamers, drills, taps, dies, counterbores, cutters, hobs and carbide tools are quickly available wherever you are located. Warehouses in Chicago, Cleveland, Detroit, Fort Worth, Los Angeles, New York and San Francisco. Call your Butterfield Distributor.



BUTTERPIELD DIVISION, UNION TWIST DRILL COMPANY, DERBY LINE, VERMONT For more data circle 376 on Postpaid Card



CARBIDE "THINSAWS"

FOR FAST, PRECISION SAWING, SLOTTING or SLITTING and LONGER SAW LIFE

Gay-Lee Carbide "Thinsaws" maintain positive alignment for full-depth cutting without run-out. "Thinsaw" thickness as low as .030" with tolerance held to .0001". Sizes from 11/4" to 10" O.D.

Patented carbide tip design and circular seat mounting assure maximum brazing area, positive seating and greater holding strength - tips will not break loose.

For fast, precision sawing, slitting or slotting of cast-iron, non-ferrous, plastics, wood, etc., use Gay-Lee Carbide "Thinsaws". Any tooth form available. For application recommendations, send details of your problem.

Patented-Manufactured under license.

CARBIDE SAW SPECIALISTS

For more data circle 377 on Postpaid Card

seat assures maximum brazing area and holding strength.

FROM DENISON a small hydraulic press so productive it...

GUARANTEES YOUR SAVINGS

If in 45 days the Denison Model "A" Multipress does not cut your production costs or does not improve production quality, simplify operation or give your shop more versatility - simply return the press.

Multipress is ideal for assembly, forming, staking-and 101 other shop jobs. No cost or obligation to try it out now, in your own plant.

You pay only for the freight

1-ton and 2-ton ram capacity. 1-ton \$395 · 2-ton \$595



Denison Model "A" hydraulic Multipress. Available in

Write for your copy of the detailed bulletin DENISON ENGINEERING DIVISION

American Brake Shoe Co. 1254 Dublin Road Columbus 16, Ohio

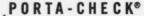
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AMES

Masters of Measurement



A transistorized comparator for fast, accurate measurement to .00001".



200 SERIES

One of four sizes; made to AGD specifications.

For more than half a century, Ames measuring instruments have been regarded as the finest available. Wherever precision is *really* important... you'll find Ames indicators, gauges, micrometers and comparators on the job.

Representatives in Principal Cities



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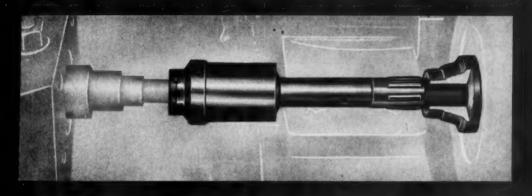
MANUFACTURERS OF MICROMETER DIAL INDICATORS AND GAUGES
For more data circle 379 on Postpaid Card

from 125 to 5 micro-inches



surface finish

in one 5-second pass!



with the revolutionary microller burnishing tool

Finishes roughest bored or turned surfaces (ie: 200 mu-in. and higher) to finishes of 4 micro inches and lower.

• Finishes in one pass at feed rates of 8 to 12 inches per minute. A one inch length in 5 seconds!

 Finishes all machineable metals...all types of surfaces; internal and external cylindrical...tapered, radial, flat.

• Use tool in any machine... on any drill press, engine or turret lathe as a secondary operation... or right on the screw machine or automatic where other operations are performed! No special equipment needed.

ADJUSTABLE FOR SIZE CONTROL

Sizes in increments of .000025" or less...
performs sizing operations never before
possible. Invaluable for sizing bearing
seats, oilite bushings, parts out of tolerance, etc.

• Run thousands of parts without tool wear. No stones to replace. Highly hardened rolls and tip last for thousands of parts. Tool maintains size setting... no adjustment necessary. Wearing parts replaceable. Simplest setup and operation...no skill required.

 Stock shipment in popular sizes. Tools and replacement parts available from stock for off-the-shelf delivery.

Refined, improved surface, a new concept. Tool marks and surface imperfections are rolled out. Grain structure is condensed and compacted...workhardened and refined; fatigue properties are improved. An ideal, wear-resistant, surface results...free of damaging abrasive grit inherent in honing or grinding.

The top twenty companies in the metal working field...plus more than a thousand others have replaced costly finishing and sizing methods with the Microller burnishing tool. In actual case histories, finishing costs have been cut by 90%... production rates increased by eight and nine times.

 Results guaranteed: The Microller is backed by Madison-Faessler's 80 years of experience in producing cold rolling tools

 and is sold on a results guaranteed basis. Sales and service representatives in all principal cities.

Write for further information

MADISON-FAESSLER TOOL CO.

Dept. M6, P.O. Box 1137, Providence, R. I.

For more data circle 380 on Postpald Card

(Affiliated with Madison Industries)

Fiction:

Beware of fiction in the cheaper threading tool story. The truth is you want more quality threads for your cutting tool dollar. Eliminate the fiction in your cost story caused by production variables which affect your profit dollar. Hanson-Whitney's complete line of standard gages and cutting tools, featuring "free-cutting action" insure the consistent quality necessary for a steady flow of quality products.

Complete and Related "STANDARDS"

What you want is a single source for standard threading tools and gages. It's fact, not fiction, that your Hanson-Whitney distributor is the single source for these quality tools. What you want is a source for complete and related threading service. Your Hanson-Whitney distributor is the threading specialist providing these services - backed up by Hanson-Whitney's forty years of thread engineering and experience.



Hanson-Whitney

206AC BARTHOLOMEW AVE., HARTFORD, CONN. STANDARD: Taps • Thread Gages • Cutters • Fine Pitch Gear Hobs

For more data circle 381 on Postpaid Card

82





SIP No. 3K JIG BORING MACHINE Send for Catalog 1173

Illustrated is the machining of a magnesium casting for an electronic unit...(A) drilling, boring and counterboring 37 holes, 62 diameters ranging from 0.255" to 5.125"...(B) drilling, boring and counterboring 11 holes, 16 diameters ranging from 0.100" to 0.787". Here's the record:

MACHINING TIME (A)......8 HOURS, 15 MINUTES MACHINING TIME (B).......2 HOURS, O MINUTES

How's that for Production!

The machine that does it is the SIP No. 3K Jig Boring Machine. It has what it takes—ease of operation, increased generous range and capacity, plus the basic Precision that is SIP—to finish critically sensitive jobs like this so fast and so well! SIP quality and precision cost you no more.



makes Precision Production Practical & Profitable

AMERICAN SIP CORPORATION

100 EAST 42nd STREET, NEW YORK 17, N. Y.



and how's this for Accuracy?

HOLE DIAMETERS HELD TO +0.0004", -0

+0.00025", -0

Since 1926 all SIP Machines delivered to U.S.A. and Canada have been collibrated in the INTERNATIONAL RNCH (1" = 25.4 mm)

For more data circle 382 on Postpaid Card



WHAT CAN
THIS TAP
MEAN TO YOU?

"The marking is conventional ...
with the exception of
BAY STATE".

BAY STATE originally made this tough, short flute, spiral pointed, assembly type tap for rugged automotive assembly work. Its rigid construction provides the long tap life and high productivity needed for retapping under conditions of extreme and unavoidable misalignment. BUT . . . it's resistance to breakage makes it particularly effective for tapping sheet metal and other thin sections.

BAY STATE sales engineers . . . tapping specialists . . . can provide complete application engineering on any tapping problem. Prompt delivery is assured by full line inventories of distributors across the nation.

For detailed information on assembly type taps, see page 16 of Bay State Catalog 56.

BAY STATE TAPS

Bay State Tap & Die Company . Mansfield, Massachusetts



On the nearby shelves of your Industrial Supply Distributor.

For more data circle 383 on Postpaid Card

Questions and Answers about ELCIDE 75

Here's what you'll want to know about this new bacterial inhibitor for soluble oil emulsions:

Q: What is Elcide 75?

A: Elcide 75 is a new bacterial inhibitor for standard duty soluble oil emulsions. Chemically, it is a combination of Sodium Ethylmercuri Thiosalicylate (Thimerosal) and Sodium σ-phenylphenate in a concentrated solution.

Q: What does Elcide 75 do?

A: Elcide 75 controls bacteria that contaminate soluble oil emulsions. Since both chemical ingredients are anti-bacterial agents, Elcide 75's double action controls a far wider range of bacteria than the commonly used germicides.

oil. And, because machines run longer between emulsion changes, production is increased proportionately.

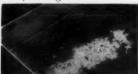
Q: What is the exact dollar return from Elcide 75?

A: No exact figure can be established because conditions vary between plants. The type of metal, machines, and operations involved, the coolant, and general plant housekeeping are all factors that help determine savings due to Elcide 75. The best way to measure its value is to try Elcide 75 and compare the results with untreated machines in your plant.

Q: How is Elcide 75 used?

A: One ounce of Elcide 75 is added to each four gallons of emulsion. You know you have a safe, effective treatment because you control the dosage.







Bacteria like these can spoil emulsions. Elcide 75 stops their damage.

Q: Why is bacteria control important?

A: Bacteria enter emulsions through the air, water, and plant debris. They multiply rapidly and cause odor, corrosion, and premature emulsion breakdown. This compounded damage costs millions of dollars each year in higher maintenance and production costs. Bacteria control reduces these expenses.

Q: How does Elcide 75 lower costs?

A: The use of Elcide 75 can increase emulsion life as much as 5½ times. You use less soluble oil. Fewer man-hours are spent servicing machines and disposing of waste

Q: Is more data available on Elcide 75?

A: Yes. Complete information on compatibility, disposal, stability, safety, and other pertinent factors is immediately available on written request.

Q: Where can I buy Elcide 75?

A: Elcide 75 is sold only through selected distributors. To place your order, or for the name of your nearest distributor, write Eli Lilly and Company, Agricultural and Industrial Products Division, Indianapolis 6. Indiana: or call MEIrose 6-2211.

(Lilly's brand of bacterial inhibitor for cutting fluids)

Package Price per Gal.

1-gal. (4 per case), polyethylene..... \$8.50

5-gallon, polyethylene. \$8.00 55-gallon, stainless steel. \$6.50

ELCIDE 75

KEEPS COOLANTS FRESH AS A DAISY!

ELI Lilly and company • AGRICULTURAL AND INDUSTRIAL PRODUCTS DIVISION • INDIANAPOLIS 6, INDIANA

For more data circle 384 on Postpaid Card

See Your COST DIFFERENCE



IMMEDIATELY AVAILABLE!
The Only Complete, Comprehensive
Line of Service Proved
STOCK NUMBERS

Say goodbye to many older, costlier metalworking methods

WRITE NOW FOR:

- . SAMPLE BRIGHTBOY HAND TABLET
- CATALOG LISTING GRAINS, TEXTURES, MACHINE SPEEDS
- NEW METHOD RECOMMENDATIONS and for name of nearest Brightboy Distributor

with this DIFFERENT FINISHING MEDIUM

Time-Savings Up to 50%

Burring • Cleaning • Finishing • Polishing

—frequently in one operation!

Brightboy, the different finishing medium, will give you a broader, wider concept of applications never associated previously with abrasives.

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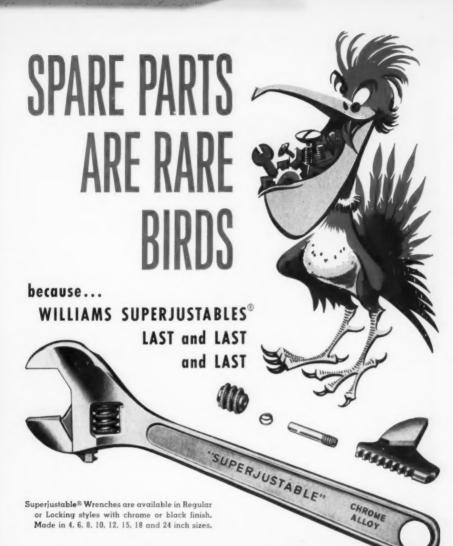
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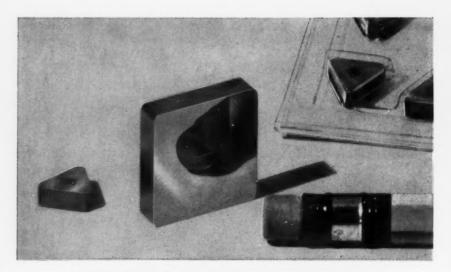
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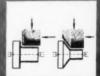
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- Reduces floor space 66%

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"The Burgmaster was purchased for this new job to reduce costs and to produce parts at more competitive rates."

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will be glad to give a free demonstration of the Burgmaster to prove how you can cut your drilling costs. Ask for free literature.







JOB FACTS

Company: Har-Bar Engineering Co., Long Beach, Calif.

Part: Special Stud-N1 Silver & Gold Plated

Material: Aluminum Alloy

Size: 1/2" long x .450 dia.

Let: 550

Tolerance: +.003

Chucking: Std. Hardinge Collet-Hand Indexing Fixture

Operations Speed

1. Center Drill 3300 2. #40 Drill 2200 3. 100° c'sink 900

Production:60 Parts per Hour

Advantages: More than Doubles Production • Eliminates a \$150

Drill Jig · Saves Walking 2.5 miles · Reduces Floor Space 66%

Machine Cost: \$550 plus extras.

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MODEL"O"

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June, 1959

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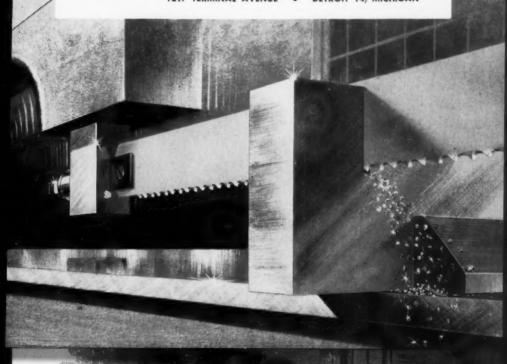
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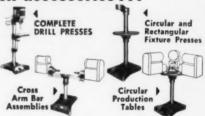
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Fred W. Vogel

Over the Editor's Desk

ONE HOE

A sound and color movie film titled "One Hoe For Kalabo," the culmination of several years of planning and production by the machine tool industry, is now ready for showings. The movie tells what machine tools are and what they do and is designed primarily as a public education project.

If any reader of this magazine is interested in borrowing a copy of the film for showing to a group, the request should be directed to Film Editor, Modern Machine Shop, 431 Main Street, Cincinnati 2, Ohio, and should specify the date of showing, the name of the organization requesting the film, the individual to whom the film should be addressed, address and telephone number.

* * * modern machine shop * * *

HELP YOURSELF

We realize that a reader of a magazine, regardless of how beneficial or helpful a magazine may be to him, will not very often take time to sit down and write to the publication to report how helpful, how good, or yes, even how bad the publication has been for him. It's human nature to take many things for granted. Our experience has taught us to expect the greatest number of letters only when we have erroneously captioned an illustration, misspelled a word, forgotten to punctuate, transposed some lines of copy, or the like.

Actually, comments of any kind from readers are most helpful to those who are charged with the responsibility of editing a magazine. This leads us to say that your comments at all times are most welcome. And this leads us further to say that periodically you may receive from us a questionnaire card asking you to indicate your preference for editorial subject matter that



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Over the Editor's Desk . . .

will be helpful to you in your work. We would appreciate your careful consideration of the subjects listed and your thoughtful selection of those which are important to you.

The card survey, aside from an actual written letter, is the best way we know to help you to help yourself.

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LET'S FACE IT

An optimistic attitude toward the current upward business trend that was punctuated with a recitation of the problems confronting the machine tool industry highlighted the Detroit Spring Meeting of the National Machine Tool Builders' Association. Speaking as President of the Association, Ralph J. Kraut, President of the Giddings & Lewis Machine Tool Company, Fond du Lac, Wisconsin, stated that unless the wage-price inflation spiral is reversed, the United States will lose its place as the leading manufacturing country in the world.

"The American economy generally," Kraut said, "is pricing itself out of the market. Wage rates abroad are only from one-fourth to one-fifth of ours; and, according to government figures, our wage rates have gone up twice as fast as output per man hour. Meanwhile, foreign technology, both in equipment and know-how, has caught up with ours. Under these circumstances American manufacturers cannot produce at competitive prices. If this continues, the inevitable result will be more production abroad and less in the United States—until we lose our position as the leading manufacturing nation.

"The machine tool industry is but one example of the mushrooming of foreign competition with production costs far below those in the United States. In 1958 England and West Germany each produced more machine tools than we did in this country. Russia is today turning out 120,000 machine tools a year and is shooting at 200,000. This compares to an output, in this country, of 300,000 machine tools in the peak year of World War II, 100,000 in the Korean crisis, and less than 30,000 in 1958. Under the wage-rate differential which exists today, this trend will continue unless corrective action is taken."

Kraut recommended a 4-point program to reverse the wage-price inflationary spiral and keep America competitive:

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THE WELDON TOOL COMPANY

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Over the Editor's Desk . . .

- Halt the inflation spiral. Both management and labor must join in holding down costs and increasing productivity and government and the public must also do their share.
- 2. Governments, at all levels, must aim at balanced budgets, less spending, elimination of give-away programs, and so on, with the objective of reducing taxes at all levels to release more venture capital. In particular, there must be a revision of Internal Revenue depreciation policies which are curtailing modernization and have contributed to today's 60 percent obsolescence factor in America's metal-working plants.
- 3. As long as the present extreme wage differential between the U.S. and foreign countries continue to exist, it is imperative that protection be provided for American industry by embargoes, tariffs or quotas.
- 4. We must wake up to the fact that our position as the top industrial nation is seriously threatened. It is high time we dropped our complacency and got to work.

"As to the immediate outlook for the machine tool industry," Kraut said, "the picture is improving every day. Business is definitely on the upturn. But this should not lessen our deep concern, for the long-term future, as to the competitive problem which is now facing all American industry."

"ONE HOE FOR KALABO"

Sound and color movie film telling what machine tools are and what they do.

Culmination of several years of planning and production by the machine tool industry.

Designed primarily as a public education project.

Copy of film is available on free loan basis for showing to groups. See item on Page 102 for details.

MODERN MACHINE SHOP

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How to MACHINE STAINLESS

Discussion covers cut-off tool design, selection, and operating techniques.

By G. J. STEVENS

Machining Engineer, Armco Steel Corporation

One of the most important tools used today in the production of stainless steel parts in screw machine and turret lathe operation is the cut-off or parting tool. Selection of the right type of tool material, grind and operating techniques can well be the difference between high and low production output of a machine tool.

Ø

Since every new application us-

ually requires a different type of cut-off tool, it obviously is difficult if not impossible to recommend a special type that would give satisfactory results for every job. Moreover, the various types and grades of stainless steel also play an important part, as they vary considerably in their machining characteristics, notably in hardness, analysis, and free-machining characteristics.

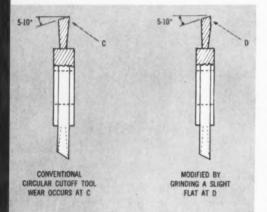


Fig. 1—Conventional circular type cut-off tool can be improved by grinding a slight flat on the side relief angle as shown.

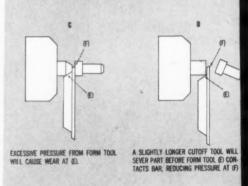


Fig. 2—This sketch shows a combination circular cut-off and form tool that will give poor tool life unless modified as shown.

STEEL

with CUT-OFF TOOLS

Of course, the free-machining or FM types such as Types 416, 430F. 303, with additions of sulphur or selenium and phosphorus, reduce the cutting forces to a great extent. In most cases a standard tool grind can be used without any major modifications. However, regular stainless steel grades in the 300 and 400 series with no FM additive frequently require a certain amount of modification for satisfactory results. The following changes have been found to be very helpful for all grades of stainless steel and are suggested as a starting point:

- 1. Use a short thick blade.
- 2. Reduce front relief angle.

- 3. Change tool composition.
 - (a) Change from high speed steel to high speed cobalt or cast alloy.
 - (b) Change from a cast alloy to carbide.
- 4. Try to mount blades close to headstock
- Look for trouble when cutting off material in chucks (because of chuck overhang). Use a collet if possible to provide greater rigidity.
- Try a small hook grind on top of blade.
- 7. Low speed and heavy feeds favor HS or HS cobalt.
- 8. High speeds and moderate

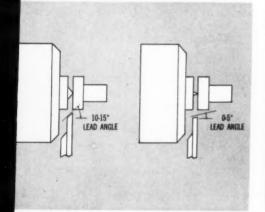


Fig. 3—A decrease in lead or end cutting edge angle will reduce the amount of tool deflection that causes rapid wear at tool points.

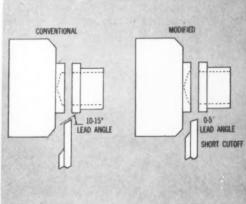


Fig. 4—When cutting off into a drilled hole, the front relief angle should be reduced and cut-off blade should be shortened as shown.

"... certain modifications in tool grinds and set-up practice that have proved out are outlined ..."

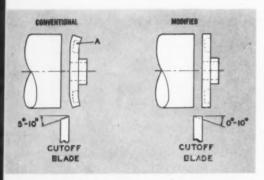


Fig. 5—Sketch shows how front relief angle of tool was changed to prevent distortion of part when subjected to cut-off operation.

to fine feeds favor cast-alloy or carbide.

Cut-off blades for small bars 3/16 inch in diameter and under are usually very thick in proportion to stock diameter; that is, a 1/32-inch thick blade cutting a 1/16-inch bar is the equivalent of a ½-inch wide form tool forming a 1-inch diameter bar. Since small bars are necessarily run at high spindle speeds in 3/8 or 1/2 inch capacity machines, the machine vibration will not permit a proper proportional blade.

Consequently, it can be readily understood why cut-off blades must be set close to the headstock when running small sizes; also why a large burr will be left on the work-piece unless an increased front relief angle is used. The use of some type of support for the stock, or a pick-up attachment for multiple

spindle machines, usually alleviates this condition.

Because different types of cut-off practices are required for adaptation to many classes of parts and machine set-up procedures, it is not practical to say what exactly would apply to all cases. However, certain modifications in tool grinds and set-up practice that have proved out through experience are outlined in the accompanying sketches.

Figure 1 shows a circular type tool used in single spindle automatics, which can be improved by grinding a slight flat on the side relief angle as shown.

Figure 2 shows a combination circular cut-off and form tool that will give poor cut-off tool life unless modified as shown. The commercial type tool, C, is correctly designed for brass or any non-ferrous material since it will operate with a short stroke of the cam and permit a fast cut-off cycle. However, the form tool angle at (E), when making initial contact with a stainless steel bar, will cause the cut-off tool to deflect into the workpiece, promoting excessive pressure and wear at (F). By modifying the tool as shown at D the workpiece will be completely parted before the form tool angle (E) makes contact with the bar. Although this method will slightly increase the time cycle because of the longer cam stroke, it will greatly decrease down time for the cut-off section and in the long run will produce more workpieces.

"... when cutting off into a drilled hole the front relief angle should be reduced ..."

As indicated in Fig. 3, a decrease in lead or end cutting edge angle will reduce the amount of tool deflection that causes rapid wear at tool points, but will increase size test or cut-off burr. This condition is not detrimental if it is followed by a secondary facing or slotting operation.

Referring to Fig. 4, when cutting off into a drilled hole the front relief angle should be reduced and the cut-off blade should be shortened as shown. In some cases this system can cause drill run-out, particularly with large drills. However, by modifying the center drill setup, the problem can be easily overcome.

Figure 5 shows how the front relief angle of the cut-off blade was changed to prevent distortion of the part when subjected to a cut-off operation. The thin bottom section of under-cut (A) was subjected to pressure by the cut-off tool when ground with a conventional 5-10 degree front relief angle. This angle deflected the blade and caused deformation. By using a modified front relief angle, 0-10 degres, ground just the opposite to the conventional method, the cut-off blade was deflected toward the material in the headstock, thus preventing deformation of the finished part.

Figure 6 shows the importance of

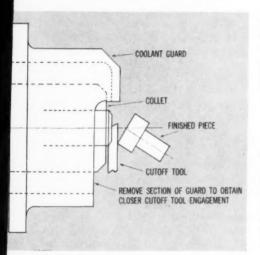


Fig. 6—Set cut-off tool as close as possible to collet or spindle. If necessary, remove slight amount of material from coolant guard to get tool closer to spindle head.

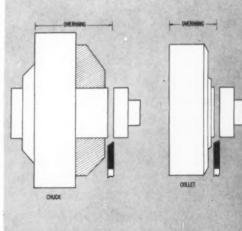


Fig. 7—Carbide blade cut-off tools have been found to produce much better results in turret lathe operations if a collet holding mechanism is used instead of a chuck.

"... carbide cut-off tools will produce better results in turret lathe operations if a collet-holding mechanism is used . . ."

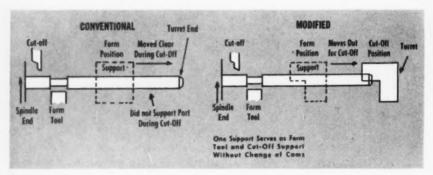


Fig. 8—By modifying the bushing support to a half round shape as shown in this sketch, the same support was used for both form and cut-off tools with considerably better results.

setting the cut-off blade as close to the collet or spindle head as possible. In some cases, with old style equipment, it may be necessary to remove a slight amount of material from the coolant guard on the headstock to enable the cut-off tool to get closer to the spindle head.

Referring to Fig. 7, carbide blade cut-off tools will produce much better results in turret lathe operations if a collet-holding mechanism is used instead of a chuck. Because of

excessive overhang a heavy chuck will cause rapid tool wear.

Figure 8 shows a conventional cut-off and form tool setup on a Brown & Sharpe automatic, which used a bushing support for the form tool but did not provide any support for the cut-off tool. This caused poor cut-off tool life and a large burr. By modifying the bushing support to a half round shape, the same support was used for form and cut-off tools with better results.

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The Grinding Wheel. Revised Edition. Published by Grinding Wheel Institute, 2130 Keith Bldg., Cleveland 15, Ohio. 32 chapters. 532 pages. Price, \$4.95.

This thoroughly revised and updated edition of "The Grinding Wheel" discusses grinding wheels, grinding machines and grinding operations from a basic, as well as a practical, working standpoint, From the opening chapters, which discuss abrasive materials, wheel shapes and sizes, bonds and wheel manufacture, through the entire range of abrasive operations, covering not only metalworking, which comprises the largest part of the book, but the grinding of ceramics, glass, marble and concrete, all conceivable major grinding operations have been covered. In addition, special chapters

deal with the Evaluation of Surface Quality, Truing and Dressing, Grinding Fluids, and Factors Affecting Wheel Selection. The practical aspect has been stressed throughout the book, with many hints for efficient grinding, wheel selection and trouble shooting.

The current, revised edition is based on the 1951 edition, greatly expanded with much added information. It contains over 100 pages of new material. Four new chapters have been written: Mounted Wheels, Reinforced Wheels, Automation and Advanced Mechanization and Safety. Many new subjects are introduced in the revised edition and have been incorporated in standing chapters; among these are: Jig Grinding, Electro-Assist Grinding, Optical Projection Grinding, Filtering of Grinding Fluids, and Grind-

ing of Ceramics.

Noteworthy additions have been made in the chapters on: The Abrasive Materials, Disc Grinding, Roll Grinding, Costs, Evaluation of Surface Quality, and so on. Recent developments in contributory fields, aside from the grinding wheel and the grinding machine, have been examined. These include such subjects as: automatic sizing, automatic loading and unloading, man-made diamonds, and so on.

One of the most valuable sections in the book is a trouble-shooting chart and a wheel selection chart. In the former are discussed, in eight pages, the majority of troubles which beset the grinding operator with the corresponding correction leading to the elimination of the trouble. The detailed 16-page wheel selection chart gives wheel recommendations for every major kind of material

from agate to wrought iron. Wheel selection for zirconium, ceramics, germanium, titanium, is discussed in the proper chapters. Safety has been given a chapter of its own.

modern machine shop

Machining Honeycombs with a "Hula Head"

A machine cutter head with the capability of performing a little Hawaiian dance hip movement has been developed by The Martin Company, Baltimore, to machine compound contour structural shapes from honeycomb core material. As shown in the illustration, a modified stylus with five pick-up points (left) converts a standard 3-axis cutting machine to a 5-axis operation with the newly design head (right). The stylus rides the surface of a wooden or plaster contoured model and transmits rise, fall, and tilt motions to the cutter head.



Operator is shown machining honeycomb structure using Martin-developed "Hula Head."

LET AN AUTHORITY TELL YOU



How to Solve Your Supervisory Problems

By ALFRED M. COOPER
Contributing Editor, Modern Machine Shop

Most of the supervisors and executives I know are considerate of the health and well-being of everyone in their organization — with the possible exception of their own. Fifty years ago someone stated that no man ever works himself to death, and this may even have been true of supervisors—fifty years ago. I am not so sure it is true today.

Every time a group of industrial medical directors meet in convention their most common subject for discussion is likely to be ways and means of lengthening the life-expectancy of the head men within their various companies. Among the most common methods recommended by the medical men for obtaining this objective are the following:

1. Frequent reference is made to the opinions expressed in writings of Dr. Alexis Carrell, who appears to have given this subject careful study as far back as 1935. Dr. Carrell's statement that most mature men place altogether too much reliance on exercise as a means of keeping fit is often quoted. Also, increased stress is now placed on his contention that physical exercise, so essential in a man's youth, may prove detrimental to men old enough to hold executive rank. Apparently this is particularly true when such activity must be confined to weekend spurts of violent exertion.

2. Dr. Carrell has also pointed out that, contrary to most popular thinking, an extremely capable, creative mind may function in a body that is far below par, physically speaking. A little thought and observation proves there is much truth in this contention.

One of the greatest engineering intellects of this century was that of Charles Proteus Steinmetz, a tiny hunchback of a man who once told me that he had never known an hour in his lifetime that was entirely free of bodily pain. Yet this little man gave us the Mazda electric lamp, devised an entirely new system of mathematical calculation, and found time to lecture often to the fortu-

For answers to your perplexing managerial problems address your letters to: Mr. Alfred M. Cooper, MODERN MACHINE SHOP, 431 Main St., Cincinnati 2, Ohio. nate students of a nearby college.

So it would appear that an executive or supervisor who is not in the best of health may nevertheless function most effectively. And if Dr. Carrell is right, exercise may not be the best answer to regaining health.

3. The above reasoning may influence the thinking of those industrial medical directors who now contend that the conventional semi-annual physical check-ups may be of little value in guarding the executive's health. One of these physicians reports that the life-expectancy among the executives in his company is but 54 years. He blamed this fact on several factors, one of which was the physical examinations of head men at too infrequent intervals.

He said, "Too many diseases of the heart, kidneys, and circulatory system, as well as cancer, may begin their inroads immediately *after* the semi-annual checkup, and the early symptoms are usually not painful. But within six months such trouble may have become too far advanced. If we are to depend on regular physical examinations these should occur at intervals of 30 days."

4. A fairly new term in medical parlance is "the worry hangover." As usually applied, the reference is to the executive's inability to leave his worries at the office, but sometimes refers to a tendency to worry needlessly at any time.

Physicians are careful not to advise anyone to refrain from worrying. They are aware that anyone bearing the burden of responsibility inescapable by the executive in today's industries would be less than human if he did not engage in some worrying. They only ask that problems permitting immediate solution

be acted upon before leaving the office, while those insoluble for the moment be definitely pigeonholed until 9 o'clock next morning.

This sort of advice makes much more sense than those flat admonitions of the Pollyanna school of writers to the effect that we must all "stop worrying." Such writers usually worry ceaselessly about the size of their royalty checks.

5. The executive's physical condition may have a direct bearing on the degree of forcefulness, kindliness, and tact he evidences in dealing with subordinates. Much emphasis has been placed on the value of delegating authority as a means of relieving the executive or supervisor of overwork and worry. This admonition usually is helpful, but there are also some possible hazards. One is that certain head men worry even more after they have placed increased authority in the hands of a lieutenant. Also, there are assistants who dislike assuming additional reponsibility. So delegation, while usually desirable, may not always lighten the executive's load of worry.

The demands of any supervisory or administrative job may vary greatly. Most executives can adjust their living habits to these demands, but in this fast-moving world drastic changes may occur overnight. Promotion to a much more responsible job, and even transfer to a strange community, may upset fixed habits and tempt the head man to overdo. Thereafter he must adjust to new conditions and increased demands or suffer the results of neglecting his health. At such a time the monthly physical checkup may prove of value to the executive.

CUTTING TOOL ANALYSIS

How to figure a 27 percent reduction in the cost of a turret-lathe operation.

By C. W. S. PARSONS Author of "Estimating Machining Costs"

A well-known manufacturer of machinery was making tapered rollers out of 61/4-inch round SAE 4150 steel bars. The rollers, as shown in Fig. 1, were 4.500 inches long with 3.000-inch diameter holes into which later were pressed bearing bushings. The "o.d." varied from 6 to 5 7/16 inches end to end, before being given 1/8-inch end chamfers. Production was about 500 a month.

The job was run on a 4A Warner & Swasey saddle-type turret lathe equipped with 25 h.p. motor. As shown in the breakdown in Fig. 2, the overall time per piece was 15 minutes, based on 80 percent machine efficiency. Of the 12 minutes floor-to-floor time, 5.13 minutes or about 43 percent, were taken up with the so-called manual operation-elements such as material handling and machine manipulation, much of it mechanically assisted. The time

of the cutting tools contributing to the work-cycle time was 6.87 minutes. The output was 4 pieces per hour.

To keep ahead of increasing costs, the company had a policy of systematically studying each job to find ways of securing improved operation. No change in the design of the part was contemplated. In this case increased productivity hinged on two distinct but closely related factors.

As the job was run, the speeds and feeds had conformed fairly closely to those specified in the machinetool, builder's handbook, for the class of steel being machined. Except for hss (high speed steel) drills, carbide cutting tools were otherwise used. The 4A turret lathe with 25 h.p. motor was quite able to handle the work.

As re-engineered, the speeds and feeds were somewhat changed. This

was brought about by analysing each cutting tool in terms of its design and operating characteristics. The basis of analysis, as will be shown, was generally to check tool life for minimum cost and to adjust the other variables affecting cuttingtool operation so as to give as much output as possible with the h.p. capacity available.

That last consideration, h.p. capacity, introduced the second factor upon which productivity hinged. To get the output the cutting tools were capable of, it was necessary to shift the job to another machine, a 4A Warner & Swasey turret lathe with a two-speed 50/25 h.p. motor. The breakdown in Fig. 3 shows how the output was then changed for the better, to about 5½ pieces per hour.

Original Operation

As shown in the Fig. 2 breakdown of the original operation, there was some combining of cutting tools in the successive steps of the work cycle.

Following advance of stock to stop, labeled "bar forward" and so on, in the breakdown, with the center or starting drill was combined a chamfering tool. Then following the taper turning, while opening the stock with a 1½-inch hss twist drill, tools mounted on the square turret were fed in to chamfer the left end of the piece and to face the right end as far in as the 3-inch diameter.

During the boring-tool passes, 2.875-inch and 3.000-inch diameters, the square turret was indexed and the cut-off tool fed in part way. Altogether, these three tool combinations accounted for about 4 minutes of free-machining time.

In the taper turning, as shown,

the calculated h.p. requirement was 35 h.p. maximum at the deepest end of the pass. Under the circumstances, the duration of the 10 h.p. overload came within limits prescribed by the manufacturer of the machine tool. The chamfering and facing combined with the drilling required 20 h.p. at the start of the in-feed of the tools because the chamfering tool was taking in not only the width of the 1/8-inch chamfer but also the width of the cut-off. For a distance in of about 3/8 of an inch the combined widths of cut, chamfering and facing, totaled about 0.400 of an inch. The $2\frac{1}{4}$ -inch 2insert carbide boring tool required about 25 h.p. to make its pass.

Chargeable cutting-tool time was 6.87 minutes, about 57 percent of bare floor-to-floor time. Two of the square-turret manipulations rode free during hex-turret-tool passes.

Revised Turret-Lathe Operation

As shown in Fig. 3, the pattern of the revised turret-lathe operation was pretty much the same as that of the original. However, the 1½-inch drilling was combined with the taper turning. And the 2¼-inch and 2.875-inch boring passes both required nearly the full 50 h.p. of the machine motor then made available for the job.

As soon as the 2,875-inch bore started, the operator indexed and started the cut-off tool, which ran in at 0.006-inch feed through the time of the 3.000-inch finish bore. Then the spindle speed and the feed were reduced, to finish separately the last 1/4 inch of the cut-off.

However, a prime consideration was the use of cutting-tool analysis to show how the speeds, feeds and

Cutting Tool Analysis . . .

other variables affecting tool life and horsepower requirements could be dealt with to advantage.

In this case, the chargeable machine-handling time of less than 5 minutes was about 53 percent of the floor-to-floor time. With the chargeable cutting-tool time reduced from 6.87 minutes to 4.15 minutes, the difference between the overall times. 15.00 minutes in the original operation and 11.00 minutes in the revised operation, indicates a saving in the amount of time to run the job of nearly 27 percent. To the extent that greater productivity was secured by means of proper tool analysis supported by adequate power at the machine motor, the earning power of the shop, and its ability to handle more work with the same floor space, were increased.

Shop Cost Versus Raw-Stock Cost

The point of greater output with the same floor space is highly important, considering the cost of building construction. This is emphasized to clarify the fact that there was much to be gained by reengineering such a machine-tool operation, even for a shop-cost saving per piece of 40 cents.

But the cost reduction indicated above by no means covers all the possibilities of lowering the price with which the sales department must work. A major additional source of cost reduction may well be found in the scrutiny of the cost of the raw stock.

The engineering design of the workpiece involved choice of the raw material to be used, its form,

the amount of it, and of course its "shopability." In this case the 6½-inch bar stock, some 4¾ inches of it per workpiece, weighed upward of 42 lb. At say 12½ cents per lb., the material cost of the tapered roller ran over \$5 per piece compared with the \$1.10 to \$1.50 machining cost. An 8 percent saving in material cost would in this case fully equal the indicated 27 percent saving in machining cost. Both the design engineer and the purchasing agent had here a problem and perhaps an opportunity.

It is not within the scope of this article to expand on this aspect of the case. Not to comment on it, however, would be to make a serious omission.

Analysis of the 1 1/8-Inch Drill

What follows has mainly to do with the business of making the cutting-tool analyses. These analyses made use of commonly recognized relationships between cutting speed and other well-known variables affecting tool life; i.e., the ability of the cutting tool to stand up in service and produce satisfactory parts,

The more cutting tools working on a given machine or mechanized machine line, the more definitely should there be a prescribed number of workpieces machined between grinds or tool changes. In the case of throwaway tools, a new cutting edge should be put to work well before the old one reaches the point of failure. In the case of brazed-insert or solid-piece tools, when reasonable yet only moderate wear has occurred, the cost of reconditioning is always less. In any case, the quality of work, and freedom from mis-

haps, are then both promoted. By means of cutting-tool analysis, conditions leading toward satisfactory operation in these respects can be anticipated at the time the job is technically planned and its cost estimated, in advance of the work being put in the shop.

The technique of cutting-tool analysis used is here explained somewhat fully in connection with the 1½-inch drill (see Fig. 4). In the re-study of the job referred to above, the taper-turning and the boring tools were also similarly analysed (see Figs. 5 and 6).

In making an analysis of a 11/8inch drill, or of any other key cutting tool, it is necessary to have known starting points relative to each of the variables affecting the performance of the given cutting tool. A glance at the tool analysis. Fig. 4, shows that the pertinent variables, listed as numbered items accompanied by convenient symbols, included such things as tool material, workpiece material, microstructure, surface condition, coolant (cutting fluid), Brinell-hardness number, kind of tool, number of teeth (cutting edges), nose radius, side-cutting-edge (lead) angle, side rake, cut (depth or width of), tool life, feed (or chip thickness), spindle r.p.m. and h.p. at the motor.

All of the foregoing variables have some bearing on what cutting speed in surface feet a minute (s.f.m.) may be used. So the right-hand column of the tool-analysis form provided for progressive entries for cutting speed as it is affected by the different variables.

As mentioned, in the original operation of machining the tapered roller the speeds and feeds employed followed in general the values published in a manual put out by the machine-tool builder. If anything, the data in this manual were more detailed than those given in many handbooks supplying machine-tool operation cutting-speed tables.

But the real problem, as it commonly exists, is how to spot the "tabular values" of the above-listed variables that applied to the cutting tools used when the data for the handbook tables were originally gathered and compiled. The job of tool analysis is to compare those original values with those which apply to the given job being studied.

For example, the manual specified that the cutting speed for a hss drill working in a Class C steel should be 60 s.f.m. presumably regardless of drill diameter. Within limits that is of course correct. But by analogy, if you double the drill diameter you double the cut (width of chip). Analysis indicates that for the same tool life with doubled diameter the cutting speed must be reduced. The necessary speed-multiplying factor is about .78 for a hss drill working

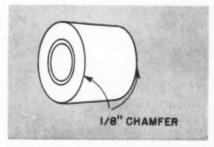


Fig. 1—Tapered roller: stock diameter, 61/4 inches; length of finished part, 4.500 inches; bored for 3.000-inch o.d. bearing bushing; tapered 6 to 5 7/16 inches; ends given 1/e-inch chamfer; raw material, SAE 4150 bars.

A Case of Cutting Tool Analysis . . .

Operation—elements, equipment, tooling ²	Feed per rev	Tool travel	Req.	Sp	eeds	1	minutes manual	Req.	Pcs. per grind ³	
1 Bar forward4							1.50			
2a Start drill 3/4	.009	.235	26	174		.15	.44			
b Chamfer r. end	.009	.188	21	174		(0.12)				
3 Taper turn	.023	4.500	196	220	134	1.47	.55 .51	(engage taper) 35 max 21 (retr. drill)		
4a Drill 1 1/8 dia.	.0124	4.838	390	62	212	1.84	.44	(,	
b Face r. end,										
chmfr. I. end	.008	1.250	156	350	212	(0.74)	(0.35)	20 max.	-	
5 Bore 21/4 dia.	.0124	5.162	417	250	424	.99	.44	25	51	
6a Bore 2.875	.017	4.875	286	250	326	.88	.44	21		
b Start cut-off	.003	.246	82		326	(0.25)	(0.35)	3		
7a Bore 3.000	.0124	4.500	363	262	326	1.11	.28	6	33	
b Continue c/o	.003	.894	298		326	(0.92)				
8 Finish c/o	.003	.300	100	215	234	.43	.21			

Totals 6.87 5.13 5.13

Floor-to-floor time 12.00 min.

Over-all time, 80% eff'cy ...15.00

Pieces per hour 4

Cost at 10 cents per min. . . . \$1.50 each

Fig. 2—Breakdown cost estimate of the original operation of machining tapered steel rollers' on a 4A Warner & Swasey saddle-type turret lathe equipped with a 25 horsepower motor.

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June, 1959

¹ Raw stock 61/4-in. dia. SAE 4150, pc. length 4.500, c/o 1/4-in., 1/32 to face.

²All cutting tools carbide except drills; 2½-in. and 2.875, 2-insert.

³As reported from original operation.

⁴Includes bar forward to stop, and secure; place bar in machine; remove finished piece; retract hex turret, index and advance.

in steel. That explains why some people say that larger drills are less efficient. Yet because of the greater feeds which larger drills can take, they actually require slightly less horsepower per cubic inch of metal removed.

To get back to the matter of starting points in cutting-tool analysis, as in Figs. 4, 5 and 6, one basis used is as follows: a hss single-point cutting tool with standard shape and lubrication is said to have a 60-minute tool life in cutting SAE 1112 steel at 180 s.f.m. Details pertinent to this may be found in Boston's "Metal Processing" (Wiley, 1951), in the "ASTE Tool Engineers Handbook" (McGraw-Hill, 1949), and in Parsons' "Estimating Machining Costs" (McGraw-Hill, 1957).

Study of Fig. 4 Drill Analysis

The following explanation of the Fig. 4 analysis of the 1½-inch drill used in machining the tapered rollers includes comments relative to each of the items or variables listed.

In the analysis the "tabular" values of the variables refer to starting-point conditions. The "job" values of the variables refer to conditions that exist or will apply in the job as it is run.

Work Material (Item 2)

In Fig. 4, item 2, the tabular value is for SAE 1112 and the job value for 4150, the workpiece material. These could have been shown as 100 percent (machinability) and 50 percent (machinability) respectively. For convenience the SAE numbers were listed and in the "R-factor" column the ratio of job value to tabular value was set up as a fraction relating the percentages

of machinability, 50/100. The R-factor column provided a place for such a fractional relationship, job value over tabular value, for every item in the analysis.

In the "V-multiplier" column was provided a place to enter a speed-multiplying factor corresponding to the R-factor. "V" is shorthand for speed (velocity). The idea was that the cutting-speed value in the next previous line (as adjusted for that variable) was then multiplied by the new V-multiplier to give effect to the difference between tabular and job values in the case of the variable under consideration.

Thus, if the R-factor in line (item 2) were 50/100, as above, and the symbol for the variable, in thise case m, had an exponent of one as in this instance, then the V-multiplier became 0.50 — obvious in the case in point. If you machine SAE 1112 at 180 s.f.m., you must machine SAE 4150 at 90 s.f.m. to hold to the same 60-minutes tool life.

Tool Material (Item 1)

Item 2 was explained first to get the reader into the picture. In the case of item 1, tool material, the tabular value was for a single-point hss tool, say measured as index 1. If the job value had been for a certain grade of carbide tool, say index 5, then the R-factor would have been 5/1, and the V-multiplier 5. That indicates that with the carbide tool the cutting speed of 180 s.f.m. for turning SAE 1112 with a hss tool would become 180 x 5 = 900 s.f.m.

However, in Fig. 4 since both tabular and job values refer to hss tools, since the tool on the job is a 1½-inch hss drill, the *R*-factor was

A Case of Cutting Tool Analysis . . .

Operation—elements, equipment, tooling	Feed per rev	Tool travel	Req.	Sp	rpm	Time, machine	minutes manual	Req.	Pcs. per grind ³
la Bar forward, etc.							1.50		
b Start drill 3/4	.009	.235	26		163	.16	.20		
							.20		
2a Drill 1 1/8 dia.	.0124	4.838	390	48	163	(2.40)	.28	3	12
b Chmfr. r. end w/dr.	.0124	.188	15		163	(0.09)	_		
							.55	(engage	e taper)
c Taper turn	.0124	4.500	363	267	163	2.22	.35	23 max.	12
3a Bore 2 1/4 dia.4	.030	5.162	172	195	326	(0.53)	.44	46	100
b Chmfr. I. end,									
face r. end	.006	1.083	181	475	326	.56	.35	13 max.	
4 Bore 2.875 dia.4	.030	4.875	163	313	424	.39	.28	49	100
							(0.35)	(index	for 5b)
5a Bore 3.000 dia.	.030	4.875	163	328	424	.39	.26	11	100
b Start cut-off	.006	1.375	280	640	424	(0.66)		17 max.	
6 Finish cut-off	.003	.300	100	215	234	.43	.24		

Totals 4.15 4.65

Floor-to-floor time8.80 min.

Over-all time, 80% eff'cy ...11.00

Cost at 10 cents per min. . .\$1.10 each

Fig. 3—Breakdown cost estimate of the revised operation of machining tapered steel rollers on a 4A Warner & Swasey turnet lathe' equipped with a two-speed 50/25 h.p. motor.

¹Raw stock 61/4 ·in. dia. SAE 4150, pc. length 4.500, c/o 1/4 ·in., 1/32 to face.

²See cutting-tool analyses.

 $^{^3}$ Based on tool life of cutting-tool analysis: for hss using 3 4 of given calculated average tool life; for carbides using 3 5 av. tool life.

⁴Boring tools, 21/4-in. and 2.875 dia. were 2-insert carbide.

1/1, the *V*-multiplier 1, and no entries in those columns were necessary. And the cutting speed in line 1 (for item 1, tool material), remains at 180 s.f.m

Microstructure and Surface Condition

In this particular case, in drilling, no change in microstructure or surface condition of the SAE 4150 to be used on the job, adverse to the 50 percent machinability rating, was contemplated. So no entries were made in items 3 and 4.

Coolant (Cutting Fluid)

Nor was there need in Fig. 4 for an entry in item 5, coolant (meaning cutting fluid). The starting-point data included proper lubrication, and the drill was to be fully lubricated.

Brinell Hardness

Also in this case, in item 6, Brinell-hardness number, in Fig. 4, there is no entry. Here the tabular value of Bhn would have been for the workpiece material as rated 50 percent machinable. If the material used on the job had a different Bhn from that of the material as listed in the machinability table, the two Bhn values would have been set up fractionally as an R-factor, job over tabular, and a V-multiplier determined according to the relationship between cutting speed and Bhn: the speed changes inversely to hardness to the vth power for the same tool life, hence the symbol h^{v} .

A simple practical method of quickly determining V-multipliers when an exponential relationship exists is explained briefly below in connection with item 13, tool life, T^n . As stated in the analysis of the $1\frac{1}{8}$ -inch drill in Fig. 4, no entry connected with item 6 was required.

Kind of Tool (Item 7)

In this case the item, kind of tool, provided for a change-over from the basic single-point tool of the starting-point data to a twist drill, with an arbitrary .70 V-multiplier to reduce speed to hold the same tool life.

There is not enough space available in an article of this kind to go through the details behind this. However, every shop man knows that chip clearance, the problem of getting the cutting fluid to the drill point, and the effect rake (item 11 covers side rake for a single-point cutting tool) enter into it.

Number of Cutting Teeth (Cutting Edges)

This item enters into the analysis of tools other than single-point. However, it was convenient in the case of the twist drill to make the pertinent cutting-speed adjustments, to hold the same tool life, when handling items 12 and 14, cut (width of chip) and feed (chip thickness). As will be seen in connection with those items, the tool analysis must be carried out in terms of a specific cutting edge. While the 11/8-inch twist drill had two lips, chip width and thickness were considered in terms of only one cutting edge. In this analysis, therefore, no entry was made in item 8 other than to refer to items 12 and 14

Tool Life, Tⁿ (Item 13)

For convenience in explanation it is appropriate to consider next the

Cutting Tool Analysis . . .

variable tool life, T^n . Each adjustment in cutting speed value other than in connection with this item corresponded entirely to the effect of the given variable upon cutting speed for constant tool life. In Fig. 4 prior to item 13 the tool life was consistently the 60-minute tool life of the starting-point data. Yet it may not be at all desirable to have a drill (or any other tool) on a particular job run on the basis of 60 minutes of cutting between grinds or tool or cutting-edge changes.

It may be desirable to prescribe in a tool analysis for a cutting-tool job-value of tool life (item 13) such as for running half a day, or a full day, or for the full length of a short job-shop operation. Or as was the policy in this case, the job value was made the calculated average tool life to provide for minimum cost of operation.

Tool Life for Minimum Cost

For the purpose of cutting-tool analysis, the tool life for minimum operating cost is the calculated average value of the variable, tool life, which balances the economic effect of faster or slower running (cutting speed selection) against the combination of value of cutting tool used up between grinds or changes, cost of maintaining (reconditioning) the tool, and cost of downtime to change tools.

The theory and mathematics involved were first announced by Frederick W. Taylor over 50 years ago, and are given in full detail in the ASME "Manual On The Cutting of Metals," 1952 Edition.

In general, tool life for minimum cost, for a hss single-point tool, equals 7 times the time equivalent of the above-mentioned costs per grind or tool change. For single-point carbide tools, it is 3 times that time equivalent. For a hss drill, it is 2.7 times that time value.

The factor used comes from the expression (1/n-1), where n is the exponent of T (as in T^n , item 13 of the tool analysis). Also, more fundamentally, n appears in $VT^n = C$, the standard tool life equation. Here V stands for cutting speed, s.f.m., T stands for tool life in minutes, and C is a constant applicable under a given set of conditions. Hence in analysing the $1\frac{1}{8}$ -inch drill, with n taken as .270, then (1/.270 - 1) = 2.7, and tool life min = 2.7 x said time equivalent of the above costs.

In Fig. 4 the job value of tool life of 38 minutes, figured as the calculated average tool life for minimum operating cost, was derived on the basis of assumed values as follows:

- (1) The original cost of the drill, \$6.00, divided by an estimated 20 grinds, gave 30 cents-worth of tool consumed per grind. This in terms of shop labor at 10 cents a minute, is equivalent to 3 minutes.
- (2) Time to change drills at the machine is 2 minutes.
- (3) Time to grind and stone drill in crib, 9 minutes.

For the $1\frac{1}{8}$ -inch drill, $T^{\text{min}} = 2.7$ (3+2+9) = 38 minutes.

Shop Instructions, Pieces Between Grinds

When the shop was instructed to drill so many pieces between drill changes, the job value, T^{\min} , of the tool analysis was multiplied by $\frac{3}{4}$

to arrive at a time representing a hss drill deviating on the short side from the calculated average tool life for minimum operating cost. This provided a margin of safety. For carbide tools a factor of 2/3 was used.

With an estimated drilling time of

Item Variables No. Name Symbol	Tabular Values	Job Values	R-factors	V-multi- pliers	Cutting Speed sfm-180 start
1 Tool mat'l t	hss	hss			180
2 Work mat'l m	SAE 1112	SAE 4150	50%/100%	.50	90
3 Microstr. g					
4 Surface u					
5 Coolant b					
6 Bhn h					
7 Kind of t k	sgl. pt.	drill		.70	63
8 No./teeth N	(covere	d by items 12	and 14)		
9 Nose rad. rw	3/4 + 1/32	0 + 1/32	1/2.5	1/1/37	46
10 Scea cz	15° + 15°	31° + 15°	46/30-1.53	1.11	51
1 Side rake s	(covered b	y item 7)		_	
2 Cut d× or w×	.100	.562/.86	6.55	.51	26
3 Tool life Tn	60	38*	1/1.58	1/.885	29
4 Feed fy	.0125	.0062 x .86	1/2.33	1/.60	48
5 Rpm	163	163			48
6 Hp motor =	.994 x .0124 x :	163 x 1.2/.80=	_3 hp		

^{*}Calculated average tool life for minimum operating cost.

Fig. 4—Cutting-tool analysis, 1½-inch high speed steel drill on revised operation, machining tapered steel rollers on a 4A Warner & Swasey 50/25 h.p. turret lathe.

Cutting Tool Analysis . . .

2.40 minutes (see Fig. 3), the number of pieces to be run between drill changes was given as $(\frac{3}{4} \times 38)/2.40 =$ about 12, even though in theory the calculated average was $\frac{38}{2.40} =$ not quite 16.

Should the operator run a drill until it becomes really dull, the cost of reconditioning it is greater, and the work may not be as satisfactory. Paradoxically, as the time to regrind them increases, tool life for minimum cost also increases, causing the cutting speed (of the analysis) to be reduced. This relationship in reverse is very obvious in comparing brazed-insert carbide tools with throwaway type carbide inserts. Since the throwaway insert has no grinding time, and the original cost per cutting edge is often less, tool life for minimum cost is much shorter in the case of throwaway insert tools—hence the faster cutting speeds definitely in order.

Determination of V-Multiplier for Change in Tool Life

In the tool analysis, Fig. 4, the variable T^n corresponds to a similar term in the tool life equation $VT^n = C$, which expresses the relationship between cutting speed and tool life when all other variables are held constant. As stated above, down to item 13 in the analysis, tool life was held to the 60-minute tabular value of the starting-point data. In item 13 the ratio of job to tabular value (the R-factor) was 38/60, expressed for convenience in using a chart as 1/1.58.

The tool-life equation states that for a given change in tool life the cutting speed changes inversely to an exponential function of the change in tool life. If you double the tool life, for example, the speed-multiplying factor (V-multiplier) is 2^{-n} . Since as stated n=.270 for a hss drill, the V-multiplier becomes $2^{-.270}=.83$ (by slide rule using log scale).

In Fig. 4, with the change from 60-minute to 38-minute tool life, with R-factor = 1/1.58, the V-multiplier was 1.58-270 or 1/.885 (also by slide rule). So multiplying 26 s.f.m., the cutting speed listed in line 12, by 1/.885, the adjusted speed for line 13 became (about) 29 s.f.m.

In Parsons' "Estimating Machining Costs" (McGraw-Hill, 1957) on p. 119 there is a graphic chart to log-log scale coordinating *R*-factors and *V*-multipliers by means of straight lines plotted for variables having exponential relationships with the variable cutting speed. This chart saves time in making tool analyses.

Using a somewhat different approach to some of the variables, the Carboloy Machinability Computer, manufactured and sold by General Electric's Metallurgical Products Department, Detroit, does eliminate making paperwork calculations in analysing cutting tools. It is still advisable, however, to make a record of the job values of the variables, once a method of operation has been determined. Otherwise, as soon as the computer is used for another problem there is no way of knowing at just how a previous solution was arrived.

In view of the fact that a record is needed, it seems that the technique of Fig. 4 described above, once

Item Variables No. Name Symbol	Tabular Values	Job Values	R-factors	V-multi- pliers	Cutting speed sfm-180 start	
1 Tool mat'l t	hss	Carb. 370		5	900	
2 Work mat'l m	SAE 1112	SAE 4150	50%/100%	.50	450	
3 Microstr. g		_				
4 Surface u	clean	sca!e		.80	360	
5 Coolant b			_			
6 Bhn h					_	
7 Kind of t k	sgl. pt.	sgl. pt.				
8 No./teeth N					_	
9 Nose rad. rw	1/32 - 1/32	1/8 + 1/32	2.5	1.44	518	
10 Scea cz	10° + 15°	30° + 15°	1.8	1.17	605	
11 Side rake s	9° + 10°	—5° + 10°		.70	425	
12 Cut d× or w×	.100	.409 max.	4.09	.60	255*	
13 Tool life Tn	60	48	1/1.25	1/.95	268*	
14 Feed fy	.0125	.0124			-*	
15 Rpm	164	163			267*	
16 Hp motor =	.400 x .0124 x	258 x 12 x 1.2/.	80 <u>-</u> 23 hp max			

*Since this tool was run with the $1\frac{1}{6}$ -in. drill, this analysis was worked back from item 16 through 12, as well as forward from item 1 through 11, and the values coordinated. In Fig. 4 the $1\frac{1}{6}$ -in. drill was given 163 rpm spindle speed. 38-min. tool life for min. operating cost. The 48-min. tool life of the taper turning tool is close to its tool life for min. operating cost.

Fig. 5—Cutting-tool analysis, taper-turning tool, on revised operation, machining tapered steel rollers on a 4A Warner & Swasey 50/25 horsepower saddle-type turret lathe.

Item Variables No. Name Symbol	Tabular Values	Job Values	R-factors	V-multi- pliers	Speed, sfm 180 (starting)		
Diameters	bored				A 21/4	B 2.875	C 3-in
1 Tool mat'l t	hss	A 78B B 370 C 330		4 5 6.5	720	900	1170
2 Work mat'l m	SAE 1112	SAE 4150	50%/100%	.50	360	450	585
3 Microstr. g		MANAGEM NAME OF THE PARTY NAME					
4 Surface u	_	_				_	
5 Coolant b		_					
6 Bhn h							
7 Kind of t k	(A & B: 2-ins	ert blade; C sgl.	pt042 land on	end)			
8 No./teeth N	(see item 7)	1					
9 Nose rad. rw	1/32	1/32					
10 Scea cz	15° + 15°	45° + 15°	2, A & B	1.20	432	540	_
11 Side rake s	9°	A & B, 9° C, 0 + 10°		.80	=	_	468
12 Cut d× or w×	.100	A .562 B .313 C .062	5.62 3.13 1/1.62	.53 .66 1/.83	230	356	563
13 Tool life Tn	60	A 78 B 66 C 65	1.30 1.10 1.08	.94 .98	217	348	555
14 Feed fy	.0125	A&B .030/2 C .030	A&B 1.20 C 2.40	.90 .60	195	313	333
15 Rpm	326 424	A 326 B&C 424			195	313	333
16 Hp motor for	B = .030 x	562 x 150 x 12 313 x 285 x 12 062 x 325 x 12	x 1.2/.80 = 4	19 hp			

Fig. 6—Cutting-tool analysis, boring tools, revised operation, machining tapered steel rollers on a 4A Warner & Swasey two-speed 50/25 horsepower saddle-type turnet lathe.

put into regular practice, has the advantage of providing a record built up quickly as job values are decided upon in the light of practical considerations tied right in with the making of a recorded breakdown estimate of the job, as in Fig. 3.

As a further example consider how the taper-turning tool was analysed (see Fig. 5). It was run with the 11/8-inch drill, in the revised turret-lathe operation, as shown in Fig. 3. So in analysing the taperturning tool it was expedient to work backward from the job values already established in Fig. 4 for the drill, clear through items 16 to 12. Then by proper choice of tool material, and job values for items 4, 9, 10 and 11 (surface condition, nose radius, side-cutting-edge angle and side rake) assurance of a sound solution in this case was made doubly sure.

Nose Radius and Side-Cutting-Edge Angle (Items 9 and 10)

In the Fig. 4 analysis of the 11/ginch drill, the nose-radius and scea values used follow drill characteristics analogous to those of singlepoint tools. There is no radius at the outer corners where drill lips meet drill periphery, hence the job value is basically zero. The addition of 1/32 to both tabular and job values amounted to shifting the point of origin of the log-log chart, to be able to handle zero values of the variable (on a logarithmic scale), and to provide for usable R-factors (ratios between job and tabular values).

In the case of the side-cuttingedge angle, the normal scea or lead angle of the cutting edge of a drill is 31 degrees, the complement of half the 118 degrees drill-point angle (90 degrees minus 59 degrees = 31 degrees). The addition of 15 degrees to both tabular and job values followed the same reasoning as that given above in connection with adding 1/32 to the nose-radius values.

Depth of Cut and Feed (Items 12 and 14)

In the analysis of the 1½-inch drill, the variable "cut" (which stands for depth of cut, or width of chip) was taken as equal to drill radius over cos 31 degrees (drill lip measured from axis to periphery, neglecting chisel edge). The value .562/.86 was taken only once because the analysis focuses on what happened to one cutting edge. An exception to this is in figuring rate of metal removal in determining the horsepower at the motor, item 16.

In the analysis of feed, item 14, the job value was taken as half the feed per revolution, times cos 31 degrees, to measure the chip thickness. In making such an analysis of a drill, you can work with depth and feed, or with chip width and chip thickness, getting closely the same results.

Calculated and Available R.P.M.

In the drill analysis, Fig. 4, the tabular value of r.p.m., item 15, was determined by relating the drill diameter and the cutting-speed value, s.f.m., of item 14, using an appropriate table. The job value of r.p.m. then became the nearest available spindle speed of the 4A W & S turret lathe being used.

Ordinarily the machine-spindle r.p.m. selected should not be higher

Cutting Tool Analysis . . .

than the tabular value of r.p.m. of the analysis. If it is more than marginally higher, it may be advisable to check back in the analysis to see how much the tool life would be reduced unless some other adjustment is made, such as reducing the feed.

In the case of a single-point cutting tool, a change of one or more of several other variables might be considered, such as tool material, nose radius, side-cutting-edge angle; and also the use of a throwaway-type carbide insert, may well be considered.

Horsepower at the Machine Motor

As a close approximation, the horsepower at the motor required to run the $1\frac{1}{8}$ -inch drill was taken as the product of: r.p.m. x (feed per revolution) x (hole area) x (h.p. at cutter per cubic inch of metal removed per minute) over (efficiency of machine relative to the power drawn by the motor). The $1\frac{1}{8}$ -inch drill, as shown in Fig. 4, required 3 h.p. at the motor.

Conclusion

Cutting-tool analyses were also made for the other key cutting tools on the revised turret lathe operation (see Figs. 5 and 6). To make the analyses and the breakdown as in Fig. 3, it took perhaps two hours of the time of a competent man accustomed to handling the techniques involved.

It would be misleading to claim that a single cutting-tool analysis will lead to a final solution of any machine-tool operation problem. In the circumstances it is something like making dies. One can spend more time, almost always, and make them just a little bit better. For the cautious it should be said that the revision should be tried in the shop, verified substantially, and necessary minor adjustments noted on the paperwork.

The time and trouble of making the foregoing revision was worth-while. The output of tapered rollers was increased from 4 to $5\frac{1}{2}$ per hour. The machining cost was reduced 40 cents per piece, or about 27 percent. Had the 4A turret lathe with 50/25 h.p. motor not been available, assuming the company could keep one busy making that kind of saving, it could well have afforded to put in such a machine.



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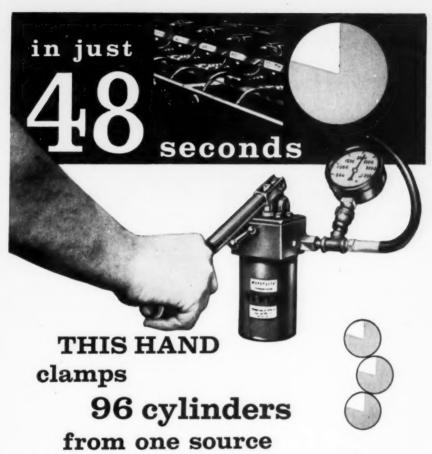


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How to Increase Dial Indicator Usefulness

In which the author presents several designs of fixtures and attachments used to increase dial indicator utility.

By HAROLD SEDLIK

Because of today's highly competitive production, industry is required to produce products requiring an ever higher degree of accuracy. To insure such accuracy, a need for positive gaging becomes apparent. Our experience shows that dial indicators can fulfill this need. In fact, it is possible under favorable conditions to obtain an accuracy of 0.000025 inch; however, this extreme accuracy is limited to dials

graduated in increments of 0.0001 inch. With the possibility of such accuracy, we consider the dial indicator to be an ideal gaging instrument for use in precision manufacturing operations.

To utilize the dial indicator advantageously for our manufacturing purposes, we have devised special fixtures or attachments designed to meet the various gaging conditions encountered. Figure 1 shows a gag-

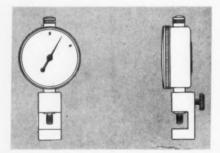


Fig. 1—Gaging fixture designed for the purpose of gaging small intricate components.

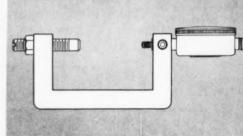


Fig. 2—Gaging fixture designed for the purpose of gaging larger type of components.

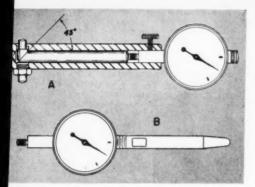


Fig. 3—Gage shown at (A) is designed for gaging bore diameters and for internal measurements between shoulders. Gage (B) is another design for internal measurements and bores, particularly of large diameter.

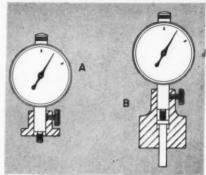


Fig. 4—Drawing (A) shows ideal gage for measuring depth of shallow impressions relative to a flat surface. Drawing (B) shows gage for measuring impressions of greater depth than possible with gage shown at (A).

ing fixture designed for the purpose of gaging small intricate components. Figure 2 shows a similar design of gaging fixture but intended for larger capacity gaging. Both gages are adjustable and can be preset to a desired setting with the use of standard blocks.

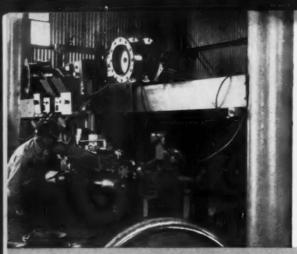
The gage shown at (A) in Fig. 3 is intended for gaging bore diameters and for making internal measurements between shoulders. We found that another excellent gage for internal measurements and bores, particularly of large diameter, can be made from a standard dial indicator by removing the threaded cap and substituting an extension rod with corresponding threads, as shown at (B) in Fig. 3. This gage with the proper extension rod provides measurements ranging from 4 inches to 6 feet. It is obvious that the design of this gage is limited to dial indicators of the type illustrated herewith.

The gages shown in Fig. 3 can be

preset with the aid of either a micrometer or gage blocks set in parallel jaws.

Figure 4 shows two designs of gages which we have found to be ideal for measuring the depth of impressions relative to a flat surface. The gage shown at (A) is designed for shallow impressions; however, the gage shown at (B) has a considerably greater depth measuring capacity. With the aid of standard size gage blocks and a surface plate (or other suitable flat surface), each gage shown in Fig. 3 can be quickly and accurately preset for gaging any depth of impression within its particular capacity.

The foregoing suggestions for minimizing gaging errors through the use of dial indicators are but a few of many that could be made. The number of applications are limited only by the ingenuity applied in devising both fixtures and attachments to utilize dial indicators to greatest possible advantage.



General view of the new fully automatic welding machine with twin welding heads used for rebuilding worn crawler tractor track rollers and idlers. Note 12-inch tubular uprights supporting the gantry-type crossbeam. Crossbeam height is adjusted by motor-driven gears acting in a vertical gear track attached to rear of each upright.

Tractor Rebuilding Costs Cut

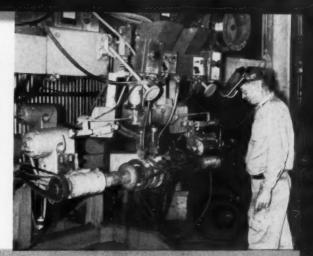
Company-built automatic twin-head welder, designed especially for rebuilding worn crawler tractor track rollers and idlers, reduces rebuilding costs by 16 percent.

By GILBERT C. CLOSE Field Editor, Modern Machine Shop

A company-built fully automatic welding machine with twin welding heads, designed especially for rebuilding worn crawler tractor track rollers and idlers, is saving customers of Kenweld Industries. Inc., Los Angeles, approximately 16 percent on this type of work and providing a wider margin of profit for the job shop itself. And according to Dale H. Helmle, Kenweld's president, the metallurgical structure of the build-up weld metal applied by the new automatic machine is superior to that obtained from the manually-operated, singlehead machine formerly employed.

The lowered costs are a direct result of the speed and convenience with which the new automatic machine can be operated. Here are some comparative figures which emphasize these advantages It required from 3 to 5 minutes to load a part into the old manually operated machine, then a track roller had to be turned through 12 revolutions for each of its two worn grooves (24 revolutions in all) while 12 circumferential weld heads were laid in each groove to accumulate the necessary build-up. The new machine can be loaded in about 20 seconds, then the track roller is

A crawler tractor track roller is shown in the process of being rebuilt on the new twin-head welder. Each track roller has two wear surfaces, and the oscillating twin welding heads rebuilds these wear surfaces simultaneously. The mechanism designed for causing the welding heads to oscillate are clearly evident in this illustration.



by Unusual Welding Process

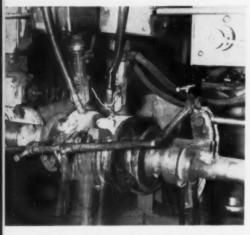
automatically turned through a single revolution while each of the two welding heads oscillate back and forth across the width of the groove to deposit the necessary build-up weld metal in a single pass. Total time required to complete a single track roller on the old machine was from 2 to $2\frac{1}{2}$ hours. With the new automatic, the same job can be accomplished and accomplished better, in approximately 45 minutes.

The principal components of the new automatic twin-head welder consist of two 12-inch diameter tubular uprights spaced approximately 12 feet apart. A crossbeam spans between the uprights and is motor powered on a vertical gear track so that it can be raised or lowered as required. Two Lincoln Electric Company welding heads, along with the associated welding wire rolls and wire feed equipment, are mounted on this gantry-type crossbeam. Thus, by

moving the beam up or down, the welding heads can be positioned to accommodate work of different diameters.

The rollers or idlers to be rebuilt are mounted in an air-actuated yoke-type work holder mechanism, as shown in one of the accompanying illustrations. This yoke is lowered to floor level for loading by an air cylinder, then raised into welding position by the same cylinder mechanism. In loading the work, one fork of the yoke is equipped with a tapered cone which fits into the hub bore of the roller or idler. The second fork of the yoke is equipped with an air cylinder driving a second tapered cone which fits into the other end of the hub bore. It is only necessary to roll the part between these cones, then as the air cylinder actuates one tapered cone into one end of the hub bore, the part is shoved laterally onto the stationary tapered cone on the op-

"... oscillating motion of the twin welding heads is accomplished by motor-driven eccentrics..."



Close-up of a track roller being rebuilt. Mild steel welding wire is used which provides necessary hardness by absorbing an alloy from the flux during welding process.

posite yoke fork. This yoke-type work holder can be rotated or tilted in either direction when it becomes necessary to deposit weld metal on the sides of a roller or idler flange.

The work is rotated during buildup by an adjustable speed electric motor mounted directly on the yoke itself.

The most interesting innovation on this new machine is the mechanism used to oscillate the welding heads laterally back and forth across the surface they are rebuilding while the work turns slowly forward. This oscillating motion of the twin welding heads is accomplished by motor-driven eccentrics with connecting rods attached directly to the heads. The oscillatory motion of the heads may

be varied from 0 to 4 inches as required to span the surface being built up. With the welding heads in oscillation, the welding beads are laid back and forth across the surface being rebuilt rather than circumferentially as was done on the older manually operated machine.

And herein lies the secret of the superior metallurgical properties obtained. The oscillatory motion of the welding heads is rapid enough so that one crosswise bead is still in a semi-liquid state when another bead is laid alongside it. Very good fusion of the beads, one with the other, is thus obtained, so in effect the applied build-up weld metal is



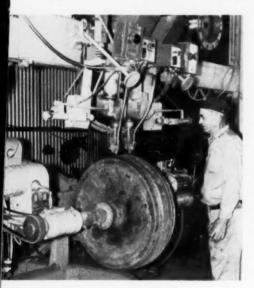
Here one of the larger track idlers is being loaded for rebuilding. Part is merely rolled into position between tapered cones on each prong of the yoke-type holder.

"... fusion of the weld beads, one with the other, results in a more dense weld structure . . ."

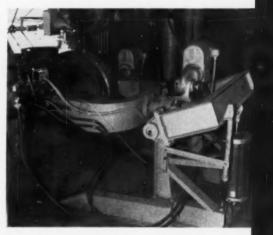
like one continuous very wide weld beads laid circumferentially around the part. According to Helmle, this fusion of the weld beads, one with the other, results in a more dense weld structure, and in metal grain orientation which is more resistant to wear than the grain orientation secured with the older circumferential weld beads.

"The circumferential weld bead had a tendency to spall and flake when under service loading," Helmle says. "The crosswise beads, fused together as they are, do not exhibit this tendency."

The yoke-type work holder always raises the work to a constant



In this view, the track idler has been raised into proper position for rebuilding, and the height of the twin welding heads has been adjusted as required by the job.



Rear view of air-actuated yoke-type work holder. The air cylinder which lowers and raises the yoke is visible at the far right. The yoke can be tilted in either direction.

center height, then the gantry-type crossbeam with the welding heads is moved up or down to adjust the working position of the welding heads. Parts ranging from 4 inches to 60 inches in diameter may be thus accommodated.

A separate Lincoln Electric Company generator is used for each of the two welding heads. Mild steel welding wire, 3/32 inch in diameter, is used along with Lincoln's special alloy flux. The alloy for the welding wire, which provides the build-up metal with the necessary hardness, is absorbed from the flux during the welding process.

The new twin-head welder is capable of applying build-up metal at the rate of $\frac{1}{4}$ inch on the radius or $\frac{1}{2}$ inch on the diameter

Tractor Rebuilding . . .

per revolution. As this is the approximate amount of wear on a roller or idler when it must be rebuilt, usually a single revolution of the part during rebuilding is all that is necessary. Of course, heavier metal build-ups would require a second revolution of the workpiece.

The illustrations with this article provide a general idea of how the new welder is constructed, and show some details of operation. It is quite obvious that some of these design features could be incorporated in welding machines used for other types of work. Twin welding heads could cut in half the welding time on many welding jobs. The yoke-type work holder has an advantage

in that it can be lowered to floor level for loading and unloading. thus avoiding lifting of the work. The crossbeam with its twin welding heads provides height flexibility that is limited only by the height of the tubular uprights between which it is mounted. The oscillating welding heads. moving laterally back and forth across the surface being built up while the work moves slowly forward. could be employed in many welding applications in order to obtain the necessary weld metal deposit in a single pass.





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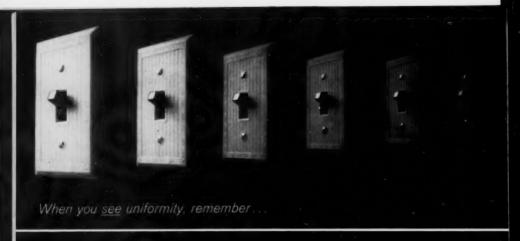


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YOU MUST START

TRAINING TOMORROW'S CRAFTSMEN



An urgent need exists for better apprentice training programs if our industries intend to adequately meet the great future demand for skilled personnel.

BY ROBERT W. BURGESS

In recent months there has been a tremendous amount of publicity in our press suggesting that young people take more scientific courses in high schools and colleges. This emphasis is good, and since our economy needs more scientifically minded people, the high school and college education provides necessary basic training. However, the ultimate reward that is often held forth for such training is usually unrealistic and misleading. In our modern world we will need more scientific thinking, but history has shown that the big new idea is not the brain child of a large group of people, but of a gifted few. The world needs more Einsteins, Morses. DeForests and Edisons, and in each generation these types of people always will stand out from the rest of us

We also need more top quality

research workers. From our research laboratories we get many new and great discoveries that were not the results of one man, but the outgrowth of a team of experts who work together to collectively solve problems. All in all, top research and development men constitute less than one percent of the people engaged in the mechanical field. These are most important people, and the world should give all possible help to young people who show any qualifications for entering the research ranks.

It is somewhat apparent that there is a sufficient number of mechanical equipment operating personnel. These are the unskilled or semi-skilled people who are operating, or can be trained to operate production machinery and automatic equipment. However, these people cannot function until the tools and machinery have been designed, built and set up for produc-

tion operation.

Between these two basic groups -research men and the machine operators — we find skilled mechanics, tool and diemakers, tool designers, production engineers and product designers. These are the craftsmen who must take the ideas and the inventions of the scientific and research and development groups, change and transpose them from the "idea" stage to a form that can be manufactured. They must then design and build the tools, fixtures, dies and special machinery that will enable industry to make the items on a production basis.

Too little attention has been given to this phase of industry. To show how this group operates, we take for example; the research and development group makes up a new widget. It is thought to have a place in our economy. The government or the sales group wants it. What steps are necessary to put it into production?

First the design must be studied from a point of manufacture. It is then necessary to make product drawings and dimension them with working tolerances. This is the first step for any manufacturable article. The men who staff this department are not scientists; they are men with engineering skills, plus practical shop training. They must have the "know how" to transform the widget from its idea stage to a form where it can be made. They must also have a good idea as to how to make it. The training necessary for this type of person is usually equivalent to an engineering degree in mechanical engineering, plus sever-

The Author



ROBERT W. BURGESS is chief engineer of the Greist Manufacturing Company, New Haven, Connecticut, a position he has held for ten years wherein he directs both tooling and the designing of products. Mr. Burgess has acquired a diversified knowledge of metal fabrication since his tool and diemaker apprenticeship days with Remington Arms Company, Bridgeport, Connecticut, in 1916. After serving in the Motor Transport Corps in World War I, he joined Mack Truck Corporation as a tool designer, later becoming production engineer. He has been associated with Easy Washing Machine Company and Elastic Stop Nut Corporation of America as chief production engineer. He was also factory manager of Service Machine Company and W. L. Maxon Corporation of Norwich, Connecticut. He is a member of the American Society of Tool Engineers and the American Ordnance Association.

al years of practical manufacturing experience.

Secondly, the design in the form of dimensioned engineering drawings must go to the manufacturing engineering group. These men who

"... we are only training about 65,000 or 26 percent of the men we need."

now "carry the ball" are specialists in production methods, types of tooling, production machines and

production processes.

It is their job to analyze the widget in its component parts and decide how the parts will be made. They work out the economics of manufacture and decide if automatic equipment is indicated, or if progressive dies or single station tools are required. The machinery in the plant that made the old style widget may be adaptable to the new one. Will a new assembly line be required or will it fit in the old one? How much will the tools and machinery cost? When can it go into production? What will the manufacturing costs be?

These are only just a few of the



"From our research laboratories we get many new and great discoveries that were not the results of any one particular man . . ."

many problems that can only be answered by men trained in production and manufacturing. These problems require answers not found in text books, nor can the scientist or research and development department give much help. It is in this area — manufacturing engineering group-for which our present education system is not training adequate replacements.

The third and final stage to be considered to get the widget into production is the actual building of the tools, dies, automatic and special machinery for final production. The craftsmen and engineers have designed the equipment, but there may be many problems that will develop between the blueprints and

building of tools and equipment,

before the first widget is off the assembly line.

This is the field of the skilled mechanic, the machinist, the tool and diemaker and the tool engineer. The United States Department of Labor reports that we need 250,000 men in this group every year, and that 44 percent of the men now engaged in this type of work will leave it for one reason or another within the next ten years. We are only training about 65,000 or 26 percent of the men we need. This is the area that should be studied because this is where the skilled manpower pinch will develop during any emergency. We have a known shortage of these people today in the rocket and missile program.

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- STANDARDIZATION PAYS -

"... the present average apprentice system has not kept pace with modern technologies."

basic training to fill this gap may be obtained from vocational schools and apprentice training in industry. The trade or vocational high schools are doing an excellent job in performing the first stage of the training, but the final stage or field training must come from apprentice training of skilled craftsmen in industry.

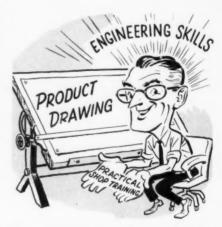
Industry today is too prone to analyze present programs and often too quick to offer excuses why they do not have one. The time is here. Take a good look at most of the industrial apprentice training programs, since the only practical way to fill this gap is through a revised apprentice training system. When we closely examine the present average apprentice system we find that it has not kept pace with modern technologies. It is patterned closer to the hundred-year-old indenture system than to our modern needs. It resists change because of tradition, or because it fails to disassociate itself from the building trade program, which requires lengthy apprentice programs for other reasons.

In 1915 the mechanical trade apprenticed 16-year-old grammar school boys, who went into shop training primarily because their family circumstances were such that they had to go to work. In many instances they followed the trade of their father, or a relative. They were often used by management as a source of cheap labor and required to do menial tasks before they had the opportunity for real training. A

great deal of their training was haphazard, and little attempt was made to further their technical education. This mechanical apprentice training procedure still exists in many shops today. It is little wonder that statistics tell us that 64 percent of the men who start apprentice training never finish their apprenticeship.

If we are to train men, for our future needs and train them right, we must, and should, look at the present economic conditions and again analyze the people we are training.

Today, the men who are suitable for training are found in two general groups. One is the vocational school graduate who has majored in machine shop work. The other is a 22 to 28 year old veteran who has



"The men who staff this department are not scientists; they are men with engineering skills, plus practical shop training."



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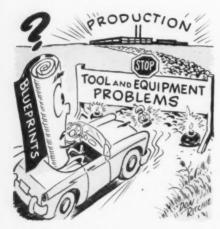


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"We should expose all apprentices to as many facets of their craft as possible . . ."



"... there may be a great many problems that will develop between the blueprints and the building of tools and equipment ..."

usually completed his military training, and now finds he must either get into a trade quickly or be resigned to being a non-skilled or semiskilled worker for the rest of his life. We find more of the latter than the vocational school graduate.

The veteran is no longer a boy; he is matured and usually the army has made him a man. Often he has a wife and family. He is seriously anxious to get ahead, and is able to learn much faster than the boy of 1915. He wants more school work and will voluntarily take evening courses to further his trade knowledge. He is past the normal "hazing" period that the 16-year-old apprentice was subjected to, and is quite resentful when used as cheap labor.

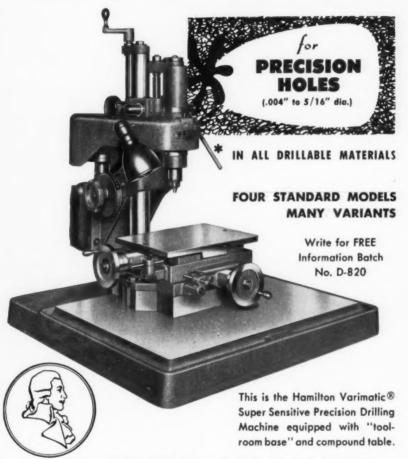
Since such a man can be given the same amount of training in much

less time than the younger boy, we should, therefore, change the program to suit. We should weigh the differences between the type of training we want to give the apprentice and what he is to be trained to do.

The old basic idea of training a mechanical tool and diemaker type of apprentice in all phases of his craft, so that he would be capable of doing any type of a job within limits of his craft at the completion of his apprentice training is not sound. Only time plus experience will develop the finished master craftsman. The more hours of labor and experience on various problems he has been exposed to, the better a craftsman he may become. However, training experience should not always be measured in hours, since 100 hours of varied experience repeated 10 times is not equivalent of 1,000 hours training.

Today is the day of specialists. For example, in theory, a tool and diemaker should be able to handle all types of tool and die work, yet we do not find this to be true in practice. A diemaker, who may be a well experienced and rated as a top man on 10 inch to 18 inch progressive dies, would be lost trying to build a compound die for a wristwatch gear, or in laying out and boring a boring fixture for an automotive crankcase, or sinking a drop forge die or making an automobile fender die. These jobs are given to men who specialize in one phase of their trade. We, therefore, should expose all apprentices to as many

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"... we have concentrated all of our training on die work, and our apprentices are trained as diemakers."

facets of their craft as possible within the area that their training is given, but we must be realistic. If the training is given in diemaking only, don't call the apprentice a tool and diemaker. If there has not been training in modern progressive and compound dies and the apprentice is kept entirely on jig and fixture work, don't call him a tool and diemaker. He is a specialist and should be called a toolmaker.

In the revised apprentice system at Greist Manufacturing Company we have concentrated all of our training on die work, and our apprentices are trained as diemakers. We have completely revised our schedule and have taken from it all of the questionable and unessential portions. We have been able to cut our primary or basic training to



"When we closely examine the present average apprentice system, we find that it has not kept pace with modern technologies."



"Only time plus considerable experience will develop the finished master craftsman."

4,000 hours from an original 8,000. We send our apprentices to the Eli Whitney Vocational School, then get in their Connecticut State Apprentice requirement of school training completed as quickly as possible in order that they will have the use of this training for shop work. They are also requested to take on extracurricular training.

Apprentices are allowed 600 training hours for school work, and if they can meet the State of Connecticut standards in less than this time, they are allowed this extra time from their 4,000 hours basic training. They are also given an hour of special instructions each week, by one of the members of the Apprentice Committee. This allows the Committee to keep a close check on the apprentices. At these meetings the apprentice is taught sub-



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"... management may find the apprentice has talent for work more advanced than diemaking."

jects not found in his school work, but which are important to his overall knowledge of the trade.

We give written examinations at the end of each 1,000 hours of training to see how well the apprentice has grasped his problems and how well he has been taught. The exam papers are reviewed with the apprentice, errors are corrected and special training is given at once when needed.

Near the end of the 4,000 hours training he is given a "piece of work" to be done without outside help, except from his foreman. This may be a small complete die, a major change on a die or something similar. The work is examined by the entire committee and also judged by it. The apprentice is eligible for a Greist Certificate only if he satisfactorily completes his written ex-



". , . he has then reached his first plateau."

amination, passes the State Apprentice requirements and successfully completes his "iob of work."

He has then reached his first major plateau. To enable him to meet the requirements for a Connecticut State Journeyman's Diemaker Certificate, he must work at least 2,300 hours at his trade, but now he works as a journeyman and is treated and paid as one. Yet he is still under the jurisdiction of the Apprentice Committee who continue to watch his progress, until he receives his State Certificate.

At the end of the first 4,000 hours, management may find the apprentice has talent for work more advanced than diemaking. We have taken men, who have completed their 4,000 hours training and sent them to other schools for further training in methods and time study work, others we have transferred to the tool design department for training in tool design.

Greist has found the basic 4,000 hours of diemaking apprenticeship will train men who are capable of going on to become expert diemakers or other types of craftsmen. We find that they respond to the treatment given them and we have been able to build up a top work force by means of this plan. We feel that the plan is realistic and sound and we urge others to try it.

This is the Greist method of helping to build and train the craftsmen and technicians of tomorrow. It is important that other manufacturing companies right now do likewise.

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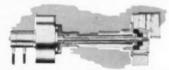
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Trepanning Provides Cost and Time-Saving Advantages on Small-Bore Job

The trepanning method of hole drilling, contrary to an old and common impression, can be as practical, economical and time-saving on short bores as on long bores. On holes that are larger than 2 inches in diameter, trepanning normally saves an average of 75 percent in production time over drilling and boring methods . . . with no increase in tooling costs.

The Black Rock Manufacturing Co., Bridgeport, Conn., producer of Reed-Prentice milling machines and lathes, found the cost and timesaving advantages of trepanning to be a factor of major importance on a recent short bore application. The company had been boring 5 13/16 inch holes $3\frac{1}{2}$ inches deep in 4340 forged stock and production time was running 48 minutes on each piece part. A six-pass operation was being used to do the job—spot drilling, two twist drilling, two rough boring and one finish boring pass. The procedure was not only slow and costly but a high percentage of rejects was helping to skyrocket production costs.

Production personnel of the Black Rock Company felt that trepanning, if adaptable to its short bore application, would solve the problem. Madison Industries, manufacturer of a complete line of trepanning tools, had long experience with the process, and was called into conduct tests. The results were truly remarkable. Production time

PREVIOUS METHOD:	SPEED	FEED
Center drill (3 minutes)	200 r.p.m.	.005"
Twist drill with 2 and 31/2-inch drills (20 minutes)	125 r.p.m.	.003"
Rough bore — single point tool, 3 passes (25 minutes)	160 r.p.m.	.005"
Total time: 48 minutes		
TREPANNING METHOD:	SPEED	FEED
Produce starting groove \(\frac{4}{2} \) by \(\frac{1}{2} \) inch deep, \(\frac{3}{6} \) inch wide \(\to \) single point tool, \(1 \) pass (4 \(\frac{1}{2} \) minutes)	97 r.p.m.	.009"
Trepan 51%6-inch diameter hole (31/2 minutes)	97 r.p.m.	.009"
Total time: 8 minutes		

Comparison of previous method with present (trepanning) method used for short-bore job.

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June, 1959

dropped from 48 minutes to 8 minutes per part—a time saving of 83.4 percent—and the number of rejects was cut in half.

The production techniques used, typical of all trepanning jobs, involved only two steps. A starting groove was cut first with a single point tool. A Madison trepanning tool was then centered into the groove and fed into the work at 97 r.p.m. at a feed rate of 0.009 inch per revolution.

The latter operation—the actual metal removal—was completed in one pass in $3\frac{1}{2}$ minutes. A comparison of the two methods is broken down as shown in the accompanying table

companying table.

The machine used in the operation was a Warner-Swasey 20 h.p. saddle type turret lathe. The coolant, Cimcool S-2 concentrate, 20-1 mix, was delivered from a standard machine coolant pump with 1½-inch hose at 3 gallons per minute.

On this Black Rock application, as on all trepanning jobs, the reasons for high percentage savings are apparent when these operating principles are kept in mind:

(1) In trepanning, only a fraction of the metal is removed in chip form. A single cutter, 3/4 inch

(A) After starting a groove, 3/4 by 1/2 inch deep, 3/6 inch wide, has been cut with single-point tool, the operator prepares to introduce the trepanning tool into the cut. (B) Double cutting edges of hollow trepanning tool, feeding at 0.009 inch per revolution, at 97 r.p.m., cut hole 31/2 inches deep in one pass in 31/2 min. Time saving, 73.9 percent. (C) Amount of chip removal is cut to a fraction as balance of metal is removed in solid core. In trepanning, chips can be exhausted through inside or outside diameter of tool.



wide, cuts a ¾-inch groove around the circumference of the part, producing the only chips created in the process. The balance of the metal is removed as a solid core. The larger the hole, then, the greater the size of the core . . . and the smaller the percentage of metal removed by cutting.

(2) Rejects are sharply reduced because diametric tolerances are easily and consistently held to within 0.010 inch total tolerance. Moreover, hole-runout is negligible—no more than 0.003 inch per foot — assuring consistent straightness. Surface finish is also exceptionally smooth—approximately 50 to 250 r.m.s. on annealed material and 32 to 125 r.m.s. on heattreated metal.

A detailed explanation of the trepanning process is now available in a brochure offered by Madison Industries, P.O. Box 1137, Providence, Rhode Island.

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Shaping Tool Shanks to High Repetitive Accuracy

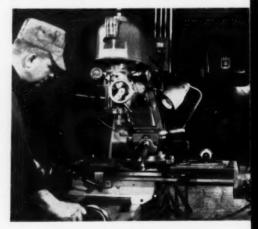
A vertical milling machine is currently providing repetitive productive accuracy within 0.001 inch, vital in the shaping of cutting tool shanks, at the Hackney Iron & Steel Company, Enid, Oklahoma, manufacturer of welding type caps, reducers and tees for the petroleum and chemical industries. The accuracy provided by the vertical mill,

product of U. S. Burke Machine Tool Division, Cincinnati, Ohio, allows Hackney to shape all of its own shanks to provide an accurate surface for fastening on cutting tips.

Since all of Hackney's products must be machined, a wide assortment of cutter tool sizes and shapes is utilized. Maxel tool steel bars are cut into specified lengths and each secured to the vertical mill table at the correct angle to provide the seat for the cutting tip that will be attached. As tools gradually shorten through use, new seats are cut, prolonging the life of tools at substantial savings for the company.

In addition to being used for shaping of the tool shanks for lathe and boring operations, the vertical mill has increased accuracy in the machining of dies and jigs. Vital for production uniformity, the jigs are machined from Firebox 70000 steel plate. The machine spindle speeds used for this type of work range from 250 to 740 r.p.m.

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Vertical mill setup used for the repetitive shaping of tool shanks to high accuracy.



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Automatic Loading Speeds Multiple Finishing Operations

Precision boring, facing and grooving from both ends of roll sleeves is a completely automated operation at the plant of Whitin Machine Works, Whitinsville, Mass. Parts are loaded from a chute into fixtures on a rotary table, machined on a Heald Model 221 Bore-Matic and unloaded into a tote bin. The entire operation is done without operator assistance. On each end of the cylinder part a bore and face are finished and a recessed groove is generated. From 0.012 to 0.018 of an inch of stock is removed in the bore diameter.

Boring heads carry feed-out quills actuated by table stroke for generating the grooves. In loading, a hydraulic plunger inserts work from the loading chute into the collet chuck at one of four stations of the rotary fixture. The new piece ejects



Setup used at Whitin Machine Works for boring, facing and grooving roll sleeves.

the finished one into a tote bin under the work table. Table travel rotates the fixture 90 degrees, presenting the work to the first boring head where one end is machined. The next rotation takes the work to an idle intermediate station and the third indexing brings the work to the second boring head for identical operations on the other end of the part. The fourth indexing returns work to loading station.

Whitin machines several different size roll sleeves in this setup. Production rates range from 105 to 210 per hour at 70 percent machine efficiency. Similar setups could be made for machining such parts as valve bodies, valve gates and wedges, housings, bushings, gear blanks, and other circular pieces.

* modern machine shop

Metal Cutting Tool Handbook. Revised Edition. Published by Metal Cutting Tool Institute, Chrysler Bldg., 405 Lexington Ave., New York 17, N. Y. 750 pages. Cloth binding, board covers. Price, \$7.50.

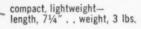
This revised edition of the Handbook presents the latest data on twist drills, reamers, counterbores, taps, dies, milling cutters, hobs, gear shaper cutters, gear shaving cutters and broaches. Each section includes information on the design. proper application, and the maintenance procedures of the tools described. This is followed by tables of dimensions and tolerances of standard sizes of tools. Engineering tables and other data commonly used in the metal cutting industries are found in a separate section provided at the end of the handbook.



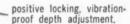
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ideas from readers

Several time-saving ideas and suggestions for the man in the machine shop.

Using a Lathe As a Forming Machine

By C. F. BROWN

Recently, our shop was faced with a problem encountered in a rework operation. A number of carbon steel agitator blades (or paddles) were designed with the 90-degree twist in the wrong direction (with reference to rotation of the mounting shaft). The heavy blades (each weighed 51 pounds) were formed in two pieces and then firmly bolted together at the center, as shown in the sketch provided below.

The machine selected for retwisting the paddles was an old, heavy duty engine lathe which was of the back-gear type and belt driven from a 30 h.p. motor. The part was aligned on approximate center. One end was firmly clamped in the tool post (using spacers as required) and the other end was gripped in a four-jaw chuck. With the lathe set in a slow, low-gear speed and the carriage locked in position, the chuck was rotated a full 180 degrees. A nominal amount of added twist (to allow for spring-back) enabled the paddle to be reformed to the proper pitch. The corrective

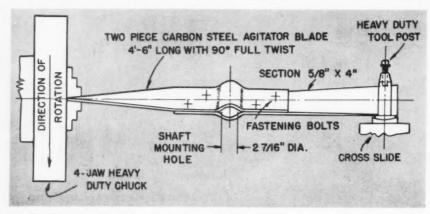


Fig. 1—Sketch showing setup for twisting agitator blades on a heavy duty engine lathe.

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work proved so effective that this method was used to form the next lot of production parts, eliminating a vendor operation.

* modern machine shop

Liquid Honing Increases Gear Cutter Life

By GEORGE SPASINK

Our production department was confronted with the problem of poor finish on the teeth of bevel gears and pinions, as well as extremely poor tool life. The factors that contributed to our problem were analyzed as follows: (1) Material (heat treated) had a tendency to weld to the edge of the cutting tool, resulting in premature failure of the cutting edge; and (2) the ground face of the tool was excessively rough, creating a saw-tooth effect on critical tool cutting edges.

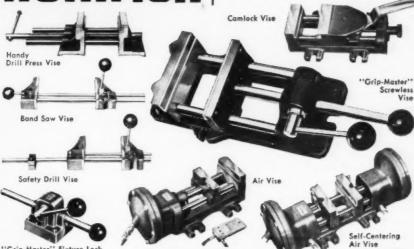
The obvious action to be taken was not to change material but eliminate the causes of edge breakdown of the tool. This was accomplished by utilizing a liquid honing machine. By liquid honing the ground face of the cutter, the grinding pattern was completely removed and the resulting matte surface was measured at approximately 20-30 r.m.s. The effect of this tool finish on the product was phenomenal. The number of parts that we were able to machine with a cutter that was not liquid honed was 3 to 4 pieces. By using the honed tool, we were able to readily process 12 to 16 pieces without chip weld or tool breakdown.

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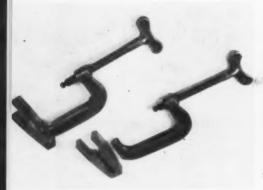






Fig. 2—Illustration shows how pullers are applied to die set for separating same.

C-Clamps Converted to Die Set Pullers

By H. J. GERBER

Figure 1 shows how an ordinary C-clamp can be easily converted into a very useful disassembly tool for die sets. A pair of these pullers will be required, one puller for each die post, in the manner illustrated in Fig. 2.

The puller is constructed by saw-

ing or torch cutting off the lower part of the "C" on the clamp. A piece of heavy bar stock is bandsawed to the fork shape shown and then welded to the remaining frame of the clamp. The opening in this fork should be large enough to slip easily over the die post.

A pair of these clamps will easily separate heavy and tightly fitted die sets which are usually difficult for one man to pry apart by the use of ordinary means.



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June, 1959

modern machine shop 167

news of the industry

Newly elected officers and appointments . . . awards . . . newly acquired firms and products . . . corporate name changes.

Edited by L. L. BALDHOFF

BULLARD ELECTS OFFICERS

Following a directors meeting held at the company offices in Bridgeport, Connecticut, The Bullard Company announced the re-election of E. P. Bullard III as president and general manager and the promotions of Francis L. Dabney to executive vice president and Paul L. Smith to secretary and treasurer.

Mr. Dabney, who joined The Bullard Company in 1953 as assistant secretary and assistant treasurer, has served successively as secretary and treasurer, and vice president and secretary, prior to his present assignment. He has served on the board of directors since June. 1955.

A member of Bullard since 1957, Mr. Smith has been controller, treasurer and now secretary and treasurer.

* modern machine shop *

ROCKFORD ACQUIRES TWO FIRMS

Rockford Machine Tool Company, Rockford, Illinois, recently announced the acquisition of the Maplewood Machinery Company, Chicago, Illinois, manufacturer of roll forming equipment, and the Ingels Elbow Machine Corporation, Chicago, manufacturer of power and hand tools designed for sheet metal work. All of the manufacturing activities will be

moved to Rockford and operated as the Maplewood Division of the Rockford Machine Tool Company.

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SUNNEN PRODUCTS, LTD. NAMES GENERAL MANAGER

August Sunnen has been named to succeed his late father, Gus Sunnen, as general manager of Sunnen Products, Ltd., Chatham, Ontario, Canada.

A nephew of Joe Sunnen, founder and president of the Sunnen Products Company in St. Louis, he graduated with honors in 1943, with a mechanical engineering degree from Michigan State University, where he received an award as Best Scholar Athlete.

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GISHOLT IN THE NEWS

Fred L. Chapman, after 30 years of service to the Gisholt Machine Company, Madison, Wisconsin, retired on April 7th, 1959. At the time of his retirement, he was vice president in charge of sales and a member of the board of directors, having been elected to both positions in 1955. He had been actively engaged in selling and sales promotion during the years prior to 1955.

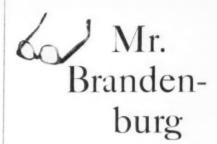
Harvey A. Waddell, treasurer since 1952, has received the added distinction of being elected secretary and has been made a member of the board of directors. A native of Baraboo, Mr. Waddell came to the company 32 years ago and was first employed as a booth clerk in the shop. Later he was promoted to clerk in the production office, then to supervisor of the cost department. His next move was into the main office, where he held various supervisory positions before being elected treasurer.

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HEALD PRODUCTION TECHNIQUE WINS MINIATURIZATION AWARD

The Heald Machine Company, Worcester, Massachusetts, has received the first Miniaturization Award ever made to a machine tool manufacturer for development of a new centerless internal grinding machine for manufacture of miniature ball

bearing races. The 1958 Miniaturization Award Committee presented a Certificate of Excellence to Heald, citing the following contributions to miniaturizaton: "The Heald Model 090 Centerless Internal Grinding Machine is considered to be a radically new development, system-engineered specifically for improved production of miniature ball bearings. Whereas previous equipment has been modified to adapt it to miniature work, the Model 090 was completely designed for this purpose alone, with all components working at optimum efficiency. With this machine, bearing races as small as 0.040 inch inside diameter can be ground to 0.00015 tolerance and 5 microinch finish in a fully-automative 15 second cycle. Major advances in design include shoe-type centerless workholding with rotation from both front and rear faces - specifically-designed super-speed wheelheads hydrostatic anti-friction feeding cross slide with ultra-sensitive electronic control-and



chose the LeBlond 16 "Heavy Duty Engine Lathe (Lathe F), Sorry, we can't give you the names of the other five.



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news of the industry . . .

sensitized method for automatically maintaining wheel-to-diamond relationship and compensating for drift."

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VULCAN TOOL ACQUIRES BREHM MACHINE AND DIES

Vulcan Tool Company, Dayton, Ohio, has acquired all patents, manufacturing and selling rights to the Brehm Tube Cutting Machine and tube cutting dies from Steel Products Engineering Division, Kelsey-Hayes Company. This action completes the transfer of the SPECO Brehm Division to Vulcan, as the Brehm "Shimmy" Die patents were purchased two years ago.

The Brehm Machine comes in two basic sizes: $\frac{3}{8}$ to $\frac{21}{4}$ and $\frac{3}{8}$ to $\frac{41}{2}$ inches. Tube cutting rate is over 7,000 per hour, depending upon the length



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of the part. Burr-free edges and little part distortion are characteristics of the machine, which will cut almost all types of material. The cutting is performed by a shearing action, so there is no scrap loss and no blades to be sharpened. Cutting adapters are quickly changed to cover the complete range of tubing sizes. The machine can be equipped with semi-automatic loaders to handle up to 20 foot tubing stock.

The die action is similar to the machine, but can be used in any standard press.

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A.S.T.E. ELECTS OFFICERS FOR 1959-1960

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news of the industry . . .

of Tool Engineers have elected new officers for the 1959-60 term of office. The new officers were inducted April 22nd, in Milwaukee, during the Society's Annual Installation Banquet and National Membership Meeting. Those elected were: president and director—Wayne Ewing, president of Arrowsmith Tool and Die Company, Los

Angeles; vice president and director—H. Dale Long, president of Scully-Jones and Company, Chicago; vice president and director — William Moreland, vice president, manufacturing of F. E. Myers and Brothers Company, Ashland, Ohio; vice president and director—David A. Schrom, works manager of Grantley Works, York Division, Borg-Warner Corporation, York, Pennsylvania; vice president and director — Philip R. Marsilius, executive vice president of The Pro-

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ducto Machine Company. Bridgeport, Connecticut; treasurer - Charles M. Smillie, president of C. M. Smillie Company, Ferndale. Michigan: secretary - H. Verne Loeppert. vice president of Boyd Wagner Company, Chicago: executive secretary-Harry E. Conrad. Detroit: and assistant executive secretary - Allan Putnam. Ray Detroit.

In addition, the national delegates elected a new board of directors. The new directors will take office at the Society's semi - annual meeting, to be held in St. Louis this September. Those elected to the board were: Wayne Ewing. chairman of the

board and national A.S.T.E. president; G. Ben Berlien, partner of Industrial Steel Treating Company, Oakland, California; Irving H. Buck, president of Tool Supply and Engineering Company, Dallas; Bruce Fairgrieve, vice president of Fairgrieve and Son, Limited, Toronto; Frank F. Ford, president of Frank F. Ford and Associates, Atlanta; George A. Goodwin, works manager of Master Electric Company, Dayton, Ohio; H. Dale Long; Philip R. Marsilius; William

Moreland: Wilfred J. Pender, Potter and Johnston Company, Pawtucket, Rhode Island: Joseph L. Petz, secretarytreasurer of Petz-Emery, Inc., Pleasant Valley, New York; David A. Schrom: Dean F. Saurenman. associate development project engineer of Schlumberger Well Surveying Company, Houston; Leslie C. Seager. chief production engineer of Eimco Corporation, Salt Lake City; and Francis J. Sehn. president of Press Automation Systems. Warren, Michigan.

SUNDSTRAND CHANGES NAME

m m s

The name of Sundstrand Machine Tool Company, Rockford, Illinois, was officially changed to Sundstrand Corporation by vote of the shareholders at the company's annual meeting.

In announcing the change, it was stated that Sundstrand's non-machine tool operations have been expanded to a point that the old corporate name no longer accurately reflects the diversification of the company's business.

Sundstrand Corporation operates five divisions: Sundstrand Aviation; Sundstrand Machine Tool; Sundstrand Hydraulics; Sundstrand-Amer-



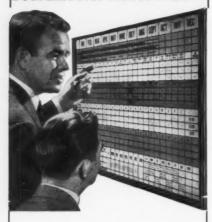
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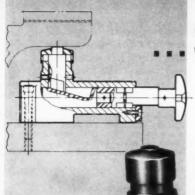
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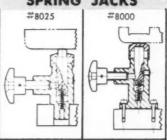
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Roll Feeds

Durant Tool Supply Co., 9 Thurbers Ave., Providence 5, R. I. Four page bulletin on Durant Automatic Roll Feeds and other press room equipment. For more data circle 5 on Postpaid Card

Lifter

Economy Engineering Co., 4507 West Lake St., Chicago 24, Ill. Specs and other details on the Mark II Shoplifter that has a 750 pound capacity. For more data circle 6 on Postpaid Card

Automatic Torch

Arcair Co., Department 216, Lancaster, Ohio. Literature on the Model Q-3 Automatic Arcair Torch that uses an electric arc to melt metal and, simultaneously, a jet of compressed air blows the molten metal away.

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Ceramic

Duramic Products, Inc., 262-72 Mott St., New York 12, N. Y. Bulletin 118. Data sheet describees Duramic Grade HT-2-M, a readily machinable hi-temperature heat stock resistant ceramic suitable to 2,200 degree Fahrenheit. For more data circle 8 on Postpaid Card

Vibration Control

The Felters Co., Unisorb Division, 210 South St., Boston 11, Mass. New six page engineering data folder provides information on simplified machine installation and vibration control.

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Gaging Products

The DoAll Co., 254 North Laurel Ave., Des Plaines, Ill. 12 page brochure on black granite gaging products features a selector chart that lists 432 combinations of plate sizes, ledges and overall accuracies that simplify the selection of a surface plate.

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Adamas Carbide Corp., Department 482, Kenilworth, N. J. Complimentary guide to proper carbide grade selection and application.

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Adjustable Clamp Co., 436 North Ashland, Chicago 22, Ill. 32 page catalog on Jorgensen and Pony Clamps.

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Air Cylinders and Valves

Clippard Instrument Laboratory, Inc., 7390 Colerain Rd., Cincinnati 39, Ohio. Bulletin 4-59 is a four page bulletin and data sheet describing the enlarged Clippard "Minimatic" line of miniature air cylinders, valves, valve operating solenoids, fittings and accessories. For more data circle 13 on Postpaid Card

Micronic Filtration

Bendix Aviation Corp., Bendix Filter Division, 434 West 12 Mile Rd., Madison Heights, Mich. Catalog BFD-53. Four page, two color brochure describes the research, engineering, production and quality control functions of Bendix in the field of micronic filtration. For more data circle 14 on Postpaid Card

Hardness Tester

Clark Instrument, Inc., 10204 Ford Rd., Dearborn, Mich. Six page bulletin on the Clark Superficial Hardness Tester. For more data circle 15 on Postpaid Card

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"FD" PRESSES

Heavy-duty open-gap production presses with Hannifin hydraulic index tables...

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Dual Safety Hand Lever Controls
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free literature . . . (For free literature use postpaid card opposite inside back cover)

Aircraft Tubing

Ohio Seamless Tube Division, Copperweld Steel Co., Shelby, Ohio. Technical Handbook A-2 is a revised, up-dated version that describes seamless aircraft tubing, carbon and alloy steels. The 70 pages cover definitions, military and A.M.S. specifications, sizes, tolerances, sampling, testing, packing, marking, machining, heat treating, properties and mill practices.

For more data circle 16 on Postpaid Card

Molybdenum

Universal-Cyclops Steel Corp., Refractomet Division, Bridgeville, Pa. New pricing schedule for molybdenum and molybdenum-titanium alloys.

For more data circle 17 on Postpaid Card

Dust Collectors

Torit Manufacturing Co., Department 712. Walnut and Exchange Sts., St. Paul 2, Minn. Forms 858, 958, 1058, 1158, 1358 and 1458 contain complete information on the company's line of dust collectors. For more data circle 18 on Postpaid Card

Jig and Fixture Components

Northwestern Tools, Inc., 119 Hollier Ave., Dayton 3, Ohio. New catalog covers over 500 components for jigs and fixtures and over 250 clamping items. Full scale tracing templates of the jig and fixture components are included. For more data circle 19 on Postpaid Card

Surface Grinders

Landis Tool Co., Waynesboro, Pa. Catalog CGS-59 describes the full line of Landis Abrasive Surface Grinders. Specifications and extra equipment are included.

For more data circle 20 on Postpaid Card

Punch Press

Kenco Manufacturing Co., 5211 Telegraph Rd., Los Angeles 22, Calif. Four page bulletin on the Electro-Safe Punch Press Series.

For more data circle 21 on Postpaid Card

Air Motors

Hannifin Co., Department 166, 565 South Wolf Road, Des Plaines, Ill. Bulletin 215 describes the company's new air motor line. Features, specs and dimensions for the five bore sizes are included. For more data circle 22 on Postpaid Card Industrial Distribution

Advertising and Awards Committee, 1900 Arch St., Philadelphia 3, Pa. "Your Double Advertising Target" illustrates typical winning copy and outlines the purposes and objectives of the Awards Program of the Triple Industrial Supply Convention.

For more data circle 23 on Postpaid Card

Coolant Systems

Trico Fuse Manufacturing Co., Milwaukee, Wis. Bulletin 37-C describes Trico-Mist Coolant Systems for drilling, tapping, milling, sawing, grinding, stamping and so on.

For more data circle 24 on Postpaid Card

Fittings

Wallace Supplies Manufacturing Co., 1804 West Cornelia Ave., Chicago 13, Ill. Eight page book, "Fittings for Structural Design," gives general information and prices on the new "Tapered Diamond Slip Fittings." Included is a 12 page book of engineering data on these fittings.

For more data circle 25 on Postpaid Card

Materials Handling Equipment

The Klaas Machine and Manufacturing Co., 4334 East 49th St., Cleveland 25, Ohio. Four page brochure lists all of the products made by this company. These include conveyors, welding and fabricating, special machinery and power punch presses.

For more data circle 26 on Postpaid Card

Hollow Mills and Tools

Genesee Manufacturing Co., 566 Hollenbeck St., Rochester 21, N. Y. Catalog No. 60 contains valuable information on adjustable hollow mills, facing and counterboring tools, tube deburring tools and special production tools.

For more data circle 27 on Postpaid Card

Materials Handling Equipment

Syntron Co., 309 Lexington Ave., Homer City, Pa. Condensed Catalog No. 591 contains information on materials handling equipment, parts handling equipment, power rectification equipment, mechanical shaft seals, paper joggers and portable construction tools.

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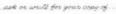
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Bunting's "Engineering Handbook on Powder Metallurgy" details manufacture and use of sintered metal bearings and parts.

CATALOG NO. 58 listing... 866 sizes of Bunthing Cast Bronze Standard Stock Bearings. 867 sizes of Bunting Sintered oil-filled Bronze Stock Plain, Flange and Thrust bearings, Made to ASTM Standards. 267 sizes of Bunting Cast Bronze Tubular and Solid 13". Bars. 84 sizes of Bunting Sintered oil-filled Bronze Tubular and Solid 5". Bars. 84 sizes of Bunting Sintered oil-filled Bronze Tubular and Solid 6"." Bars.

BAR CARD 40 listing . . . 138 sizes of Bunting Bearing Aluminum 13" Bars.

CATALOG NO. 258 listing . . . 343 sizes of Electric Motor Bearings for all makes and sizes of electric motors from 1/50 to 100 HP.



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For more data circle 431 on Postpaid Card

Lubrication

Sun Oil Co., Industrial Products Division, Department MM-1, Philadelphia 3, Pa. New bulletin, "Lubrication of Roller and Silent Chain Drives," covers principles of lubrication, maintenance and oil selection. Oil selection charts are included.

For more data circle 29 on Postpaid Card

Air and Vacuum Pumps

Leiman Brothers, Inc., 102 Christie St., Newark 5, N. J. Catalog No. 359 is a 16 page brochure that describes Leiman Rotary Positive Air and Vacuum Pumps, Gas Boosters and Air Motors.

For more data circle 30 on Postpaid Card

Saddle Control

Taft-Peirce Manufacturing Co., Woonsocket, R. I. Bulletin No. MT-003 provides engineering data on a new saddle control that improves the performance of the company's No. 1 Precision Surface Grinder.

For more data circle 31 on Postpaid Card

Bed Type Milling Machine

Van Norman Machine Co., Springfield, Mass. Form No. 2-15-59 presents the Van Norman No. 746 Versi-Matic Milling Machine which will cut or shape the newer, tougher, super alloys with exacting tolerances.

For more data circle 32 on Postpaid Card

Hard-Gear Finishing Process

Michigan Tool Co., 7171 East McNichols Rd., Detroit 12, Mich. Bulletin No. 999. Abrasive hard-gear finishing process is described. This new process is for correcting the heat treat imperfections of external gears.

For more data circle 33 on Postpaid Card

Hex Socket Cap Screws

The Allen Manufacturing Co., Hartford I, Conn. Bulletin G-25 features the company's larger head diameter hex socket cap screws.

For more data circle 34 on Postpaid Card

Shop Caddy and Clamps

Allied Manufacturing and Sales Co., 3101 West Grand Ave., Department M. Chicago 22, Ill. Data on Grand Shop Caddy that lifts or moves ¼ ton; and a complete line of clamps.

For more data circle 35 on Postpaid Card

Pumps

The Ruthman Machinery Co., 1817 Reading Road, Cincinnati 2, Ohio. Complete catalog on gusher coolant pumps, circulators, agitators and molten metal pumps.

For more data circle 36 on Postpaid Card

Inserts and Toolholders

Pratt and Whitney Co., Inc., 29 Charter Oak Boulevard, West Hartford, Conn. Circular No. 625 is a 20 page catalog that gives detailed information on the company's line of carbide throw away inserts and toolholders for high speed, precision turning and boring.

For more data circle 37 on Postpaid Card

Lubricant Selector Chart

The Alpha-Molykote Corp., 65 Harvard Ave., Stamford, Conn. Bulletin 121 is a molykote lubricant selector chart which facilitates the choice of proper lubricant for practically any extreme pressure lubrication job.

For more data circle 38 on Postpaid Card

Dust and Fume Control System

Kirk and Blum Manufacturing Co., Cincinnati 9, Ohio. 60 different plant installations are featured in this 52 page catalog.

For more data circle 39 on Postpaid Card

Hydraulic Tracer

Retor Developments, Ltd., Galt, Ontario, Canada. Four page, two color bulletin completely describes and illustrates the Mimik "4000" Hydraulic Tracer for milling machines.

For more data circle 40 on Postpaid Card

Carbon Steel Spec Chart

Peter A. Frasse and Co., Inc., 17 Grand St., New York 13, N. Y. A new chart is available (Sec. E, No. 1) with which carbon steel government specifications can be easily identified.

For more data circle 41 on Postpaid Card

Marking Machine

Jas. H. Matthews and Co., 3944 Forbes Ave., Pittsburgh 13, Pa. Bulletins 146-C25 and 146-26C describe and illustrate the complete line of Airgrit Blast-Etch Marking Machines, from standard stationary to portable and inspection type units. For more data circle 42 on Postpaid Card

Mist Coolant Generator

The Kett Tool Co., 5055 Madison Rd., Cincinnati 27, Ohio. This flyer describes and illustrates a mist coolant system, which permits fast machining speeds, increases tool life, eliminates harmful dust and requires no special coolants. For more data circle 43 on Postpaid Card

Fastener Problems and Solutions

Standard Pressed Steel Co., Box 556, Jenkintown, Pa. Form 2422 is a handy, solve it yourself checklist of common fastener problems and solutions. For more data circle 44 on Postpaid Card

Surface Plates and Stands

Herman Stone Co., 1860 North Gettysburg Ave., Dayton 27, Ohio. Bulletin A is a four page, two color publication that describes both pink and gray granite surface plates. A complete line of skelton and cabinet type stands is included.

For more data circle 45 on Postpaid Card

Gages

Federal Products Corp., 9144 Eddy St., Providence I, R. I. Arnold Gage Catalog No. 59A is a 16 page catalog that covers the complete line of Arnold Continuous Grinding Gages. For more data circle 46 on Postpaid Card

Adjustable Drill Fixture

Ace Drill Bushing Co., Inc., 5407 Fountain Ave., Los Angeles 29, Calif. Catalog D-11. Complete information on the Ace Dandee Safety-Wire Adjustable Drill Fixture.

For more data circle 47 on Postpaid Card

Wheels, Sticks, Stones and Rubs

The Carborundum Co., Niagara Falls, N. Y. Handy colored wall chart on "Industrial Specialties by Carborundum" lists specs in quick reference form on die barbering wheels, sticks, stones, rubs and finishing compounds.

For more data circle 48 on Postpaid Card

Arc Welders

The Lincoln Electric Co., Cleveland 17, Ohio. Four page folder on Lincoln Idealarc a.c. and a.c./d.c. arc welders, TM Models.

For more data circle 49 on Postpaid Card

Grinding Head

Threadwell Tap and Die Co., Greenfield, Mass. Bulletin describes and illustrates



Features Found Only In Highest Priced Radials

Finger-Tip Clutching Automatic Drill Ejector Push Button Elevation Centralized Controls Hardened Column & Way Inserts Automatic Depth Control Timken Bearing Column & Spindle Head Glides on Ball Bearing Rollers

Refer to Sweet's Machine Tool File or Hitchcock's Machine Tool Cyclopedia, 1959 editions, for our catalog.

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the Grind-A-Matic, which is an air turbine grinding head, which can be mounted either vertically or horizontally on almost any machine tool. For more data circle 50 on Postpaid Card

Dial Comparator

Alina Corp., 122 East Second St., Mineola, Long Island, N. Y. Illustrated literature on the Alina Dial Comparator Set No. 99, which is a three purpose instrument with unlimited application. For more data circle 51 on Postpaid Card free literature . . . (For free literature use postpaid card opposite inside back cover)

Hinges

Auto Moulding and Manufacturing Co., 1114 East 87th St., Chicago 19, Ill. Catalog on continuous hinges.

For more data circle 52 on Postpaid Card

Indicator Holder

Cullen Manufacturing Co., Racine, Wis. Catalog No. 958. Complete information on the Erick Magna-Holder plus an entire new line of magnetic tools.

For more data circle 53 on Postpaid Card

Heat Processing Furnaces

Despatch Oven Co., Department KP, 619 Southeast Eighth St., Minneapolis, Minn. Literature on H and HT Series of versatile heat processing furnaces. For more data circle 54 on Postpaid Card

Computing Instruments

Brush Instruments Division, Clevite Corp., 37th and Perkins, Cleveland 14, Ohio. "The Brush Recorder," Volume 3, Number 1 is a 15 page brochure that



Press Brakes

Dreis and Krump M a n u f a c t u ring Co., 7418 Souting Co., 7418 South Loomis Boulevard, Chicago 36, Ill. Bulletin No. D-59. Eight page bulletin on the Series D Chicago Mechanical Press Brakes. 40 standard sizes are included in this series with capacities that range from 90 to 500 tons.

For more data circle 56 on Postpaid Card

Precision Gages

Active Grinding and Manufacturing Co., 2119 West Hubbard St., Chicago 12, Ill. Catalog No. 58 is a 15 page brochure on Agmaco Precision Gages that are said to be quality controlled for perfection.

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For automatic screw machines and turret lathes. The lapped finish on the hard knurling surface contributes to outstanding performance and longer life.



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Metal Cutting Shears

Beverly Shear Manufacturing Co., 3000 West 111th St., Chicago 43, Ill. Bulletin CC-159. Four page bulletin features pneumatic shears, inside slotters, slitting shears, electric throatless nibbling shears and so on.

For more data circle 58 on Postpaid Card

Temperature Control Equipment

Blue M Electric Co., 138th and Chatham St., Blue Island, Ill. Bulletin 1951. Four page, two color brochure illustrates and describes mechanical convection industrial batch ovens, utility, aging drawer ovens, dry type incubators, dry air sterilizers and environmental cabinets.

For more data circle 59 on Postpaid Card

Bushings for Plastic Jigs

Ex-Cell-O Corp., Detroit 32, Mich. Catalog 355811. Data on Trans-Lok Bushings and bushing liners for embedding in castable materials, and Press-Lok Bush-

ings for pressing into drilled holes in plastics, wood or soft metals. For more data circle 60 on Postpaid Card



- compact
- more rigid
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Redesigned Wesson Universal Angle Vise No. 1A can slash costs on all angle jobs

Because Wesson Universal Angle Vises are lower, more rigid and handier, you can cut costs, improve work and multiply uses of your standard machine tools. The largest model has 4" jaw capacity and an over-all height of only 51/4".

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Small Motors

Barber - Colman Co., Small Motors Division, Rockford, Ill. Small Motors Catalog R-1. Eight page brochure describes four types of a.c. shaded pole, reversible non-geared motors.

For more data circle 61 on Postpaid Card

Marking Equipment
The Acromark Co.,
9 Morrell St.,
Elizabeth 4, N. J.
Catalog 54-HS.
Information on
Acrole af and
Acromark Presses
and equipment for
hot stamping plastic parts, products
and materials.

For more data circle 62 on Postpaid Card

Pneumatic

Nutsetters

Airetool Manufacturing Co., Springfield, Ohio. Bulletin No. 68. Complete and detailed information on this company's new line of pneumatic nutsetters. For more data circle

63 on Postpaid Card

June, 1959

Polishing Stand

Crane Packing Co., 6418 Oakton St., Morton Grove, Ill. Bulletin L-410. Facts and details give four reasons why the Lapmaster Portable Polishing Stand simplifies polishing.

For more data circle 64 on Postpaid Card

Workholding Equipment

Jergens Tool Specialty Co., 712 East 163rd St., Cleveland 10, Ohio. An all new 84 page catalog gives complete specifications and cost saving data on over 2,000 "standards," including chuck jaw blanks, handles, knobs, wheels, strap clamp as-

semblies, forged items, plus hundreds of other components for jigs and fixtures. For more data circle 65 on Postpaid Card

Cylinders

Miller Fluid Power Division, Flick-Reedy Corp., 7N023 York Rd., Bensenville, Ill. Brief, step by step case history of recent process in air and hydraulic cylinder design.

For more data circle 66 on Postpaid Card

Monitor

Go-Devil Instrument Co., 624
Dutchess Turnpike, Poughkeepsie, N. Y. Bulletin 359. Descriptive information on the new Go-Devil Monitor, the measuring instrument that needs no setting masters.
For more data circle

67 on Postpaid Card

Reversing Switch

Homestrand, Inc., 9 Addison St., Larchmont, N. Y. Leaflet describes an automatic reversing switch that has been designed for drill presses.

For more data circle 68 on Postpaid Card Magnifiers

Bausch and Lomb Optical Co., 893 St. Paul St., Rochester 2, N. Y. Catalog I-52. 14 page illustrated booklet provides a simplified, accurate means of selecting magnifiers and readers. More than 65 individual models are listed.

For more data circle 69 on Postpaid Card

Power Presses

Johnson Machine and Press Corp., 620 West Indiana Ave., Elkhart, Ind. Bulletin 1958. Complete specs on line of inclinable, straight side, gap and horn presses. For more data circle 70 on Postpaid Card

- Removing chips, shavings, filings, and airborne debris that clog machinery, distort tolerances, mar product finishes.
- Controlling mists and fogs in wet machining operations.
- Recovering valuable dusts, coolants, heated
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Reducing absenteeism with improved health and safety precautions.

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For more data circle 436 on Postpaid Card

June, 1959

modern machine shop

185

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Coolant Pumps and Systems

Graymills Corp., 3769 North Lincoln Ave., Chicago 13, Ill. Catalog and selection chart on coolant pumps and complete coolant systems.

For more data circle 71 on Postpaid Card

Machine Tool Clamps Ham

Hi-Lo Products Co., 8823 Lyndon Ave., Detroit 38, Mich. No. 858 is a two page brochure that graphically illustrates all the components of the Hi-Lo Clamp Starter Set and shows how adjustable Hi-Lo Clamps are used to secure workpieces on bolster plates and machine tool tables.

For more data circle 72 on Postpaid Card

Hammers

R. W. Hughes Industries, Inc., 2713 Ludelle, Fort Worth, Texas. Information on Safe-T-Grip soft faced tipped ham-

mers, which feature full-floating assembly that allows the relocating, repositioning and rotating of the tips, in order to equalize wear and increase the life of the tips.

For more data circle 73 on Postpaid Card

Hydraulic Machines

Logansport Machine Co., Inc., 801 Center Ave., Logansport, Ind. Bulletin No. 7A covers some of the special air and hydraulic machines built by this company. Included is information on machines designed to assemble, form. press, burnish. size. position, shear and load.

For more data circle 74 on Postpaid Card

Improved Mills

Famco Machine
Co., 3122 Sheridan
Rd., Kenosha 4,
Wis. Bulletin gives
complete information on Famco
Milling Machines
with hard chrome
plated ways. It
also describes way
curtains and
optical vernier.

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Drives and Reducers

Geneva Motions Corp., 1114 Northeast Cleveland St., Clearwater, Fla. Illustrated 16 page brochure describes Geneva mechanisms, that include External Tangen Drives, Internal Tangen Drives, External Tangen Gear Drives and Sealed Intermittent Reducers.

For more data circle 76 on Postpaid Card

Grinding and Lapping Machine

Carl Hirschmann Co., Inc., 30 Park Ave., Manhasset, N. Y. Brochure on the Agathon Tool Grinding and Lapping Machines that are especially designed for grinding and lapping carbide turn-

ing tools for Swiss type automatics, turret automatics, copy lathes and precision toolroom lathes.

For more data circle 77 on Postpaid Card

Balancing Machine

Gisholt Machine Co., Madison 10, Wis. Form No. 1207. Eight page bulletin on new Gisholt Machines for the very accurate, rapid balancing of small high speed rotating parts or assemblies containing high speed rotating parts.

For more data circle 78 on Postpaid Card

Jaw Clamps

The J and S Tool Co., 871 Dorsa Ave., Livingston, N. J. Literature on all purpose jaw clamps. which eliminate the use of U clamps, straps and fingers. For more data circle 79 on Postpaid Card

Solid Carbide Drills

M. A. Ford Manufacturing Co., Inc., 1545 Rockingham Rd., Davenport, Iowa. Fully illustrated information on the Ford Solid Carbide Hi-Roc Drill. Bulletin No. 810.

For more data circle 80 on Postpaid Card

Die Steel

Latrobe Steel Co., Latrobe, Pa. Eight page catalog and price list for the company's flat ground die steels.

For more data circle 81 on Postpaid Card

Coated Abrasives

Clover Manufacturing Co., Norwalk, Conn. Flyer gives information on the company's line of coated abrasives. For more data circle 82 on Postpaid Card



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For more data circle 438 on Postpaid Card

Maintenance and Repair

La Salle Steel Co., Post Office Box 6800-A, Chicago 80, Ill. A helpful 24 page booklet, entitled "How to Make Your Own Machine and Repair Parts Quicker and Easier," has been designed specfically to help solve maintenance and repair part problems.

For more data circle 83 on Postpaid Card

Valve Mechanical Data

Fulflo Specialties Co., Inc., 416 Fancy St., Blanchester, Ohio. 16 page, two color catalog of oil by-pass relief valves. Information includes valve description, ordering, installation and maintenance data, plus application engineering information on flow through the valves and standard pipe.

For more data circle 84 on Postpaid Card

Equipment Replacement

Jones and Lamson Machine Co., 512 Clinton St., Springfield, Vt. Booklet describes avoidable costs replacement

costs replacement formula, which is a practical aid for management and production executives who are concerned with machine tool and capital equipment replacement.

For more data circle 85 on Postpaid Card

Radial Drill

I. O. Johansson Co., Skokie, Ill. Catalog No. 359 shows how you move the drill instead of the work with the Johansson Radial Drilling Machine.

For more data circle 86 on Postpaid Card

Hold Down Vise

Illinois Metal Products, 429 West Superior, Chicago 10, Ill. Bulletin on "Imp" Hold Down Vise with spring loaded hold down jaws that automatically seat the work flat.

For more data circle 87 on Postpaid Card

Bending Devices

J. A. Richards Co., Department 6-M, Kalamazoo, Mich. Brochure illustrates and describes four bender models.

For more data circle 88 on Postpaid Card



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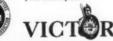
Victor Blades are made by experienced craftsmen, for specialists. We start with special steels—machines of our own design then fabricate, cut and heat treat them uniformly. Blades are coated and finished for positive identification, and packed for easy handling in your shop.

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Carbide Tools

Vascoloy-Ramet Corp., 840 Market St., Waukegan, Ill. Booklet No. 573 "Where and How to Use Tantung" gives facts about all types of Tantung tools, how to grind and braze and so on.

For more data circle 89 on Postpaid Card

Angle Bending Rolls

Kling Brothers Engineering Works, 1320 North Kostner Ave., Chicago 51, Ill. Eight page bulletin features two basic types of angle bar and structural bending machines offered by this companypyramid and double pinch types. For more data circle 90 on Postpaid Card

Lathes and Tools

South Bend Lathe Works, 425 East Madison St., South Bend 22, Ind. Bulletin No. 5905 contains data on such products as bench lathes, collets, grind-

ing attachments, rotary and indexing tables, vises, indexing centers, boring and turning tools, thread indicators and taper attachments.

For more data circle 91 on Postpaid Card

Gear Motor

New England Gear Works, Meriden Ave. and South End Rd., Southington, Conn. Flyer describes and illustrates the New England Heavy Duty Gear Motor to power machine tools. pumps, conveyors, business and vending machines and heavy displays.

For more data circle 92 on Postpaid Card

Surface Grinder

Harig Manufac-turing Corp., 5765 West Howard St., Chicago 31, Ill. Data on the 6 by 12 precision sur-face grinder and Grind-All the Fixture.

For more data circle 93 on Postpaid Card

Electric Furnaces

The Sentry Co., Foxboro, Mass. Catalog H12 gives complete data on electric furnaces. For more data circle 94 on Postpaid Card



Used by practically EVERY manufacturer of squaring shears as original equipment. Because they are ground to the closest tolerances in the knife industry - "CLEVE-LAND" shear blades insure maximum cutting life . . .

"Peerless" (high carbon high chrome) "Century" (high alloy)

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Once a study has determined the best tooling for your operations, the comprehensive Kennametal line provides a performanceproved grade to meet the specific needs of every job.

General purpose needs can be satisfied from Kennametal Group I grades which were recently expanded by the addition of grades K4H and K2S.

By moving these grades, previously classed as "premium," into the General Purpose Group, Kennametal now provides a total of seven economy-priced grades suit-

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For the ultimate in performance on specific jobs, Group II provides a grade selection tailored for today's high alloy materials, closer tolerances, higher cutting speeds, and specialized operations.



With the right tool for every operation

Kennametal offers you the world's most complete line of brazed and clamped-insert type tools . . . spearheaded by the Kendex* line with more than 50 standardized styles plus many adaptations for special needs.

Let your Kennametal Carbide Engineer work with you to get the best tooling on your machines to squeeze more profit from every job today . . . and help you get set for stiffer competition tomorrow. Call him now, or write KENNAMETAL INC., Latrobe, Pennsylvania.

*Trademark.



Partners in Progress

For more data circle 442 on Postpaid Card

free literature . . . (for free literature use postpaid card opposite inside back cover)

Measuring Instruments

Petz-Emery, Inc., Pleasant Valley, N. Y. Bulletin E describes new "Pet-line" gages and measuring instruments. Complete specifications are listed for all instruments.

For more data circle 95 on Postpaid Card

Iron Working Equipment

J. F. Kidder Manufacturing Co., Inc., 426 Colchester Ave., Burlington, Vt. Catalog No. 49. Information on punches, angle shears, angle and sheet metal notchers and deep throat punches.

For more data circle 96 on Postpaid Card

Lead Screw Tappers

Procunier Safety Chuck Co., 12 South Clinton St., Department 5, Chicago 6, Ill. Brochures on lead screw pushbutton unit and the complete tapping head line. For more data circle 97 on Postpaid Card

Abrasive Wheels and Points

Schupack Supply Co., Department MS-11, 7331 Cottage Grove Ave., Chicago 19, Ill. Illustrated catalog describes a handy, sturdy container, which holds abrasive wheels and points mounted on steel mandrels.

For more data circle 98 on Postpaid Card

Tracing Attachment

True-Trace Sales Corp., Department SL, 9830 East Rush St., El Monte 38, Calif. Bulletin No. STM-1 describes Synchro-Trace, which is a fully automatic tracing attachment for milling applications. For more data circle 99 on Postpaid Card

Lathes

Logan Engineering Co., Department L-559, 4901 Lawrence Ave., Chicago 30, Ill. Complete specs tell why Logan Lathes have a greater capacity.

For more data circle 100 on Postpaid Card

DOUBLE CRANK O.B. I.

Mew 40-Tun

ROUSSELLE PRESS

WITH NEW ELECTRICALLY

- "Plug-in" foot and hand controls.
- Single stroke, continuous and jog selector.
- Low air consumption.
- Large die area.
- Roller bearing flywheel.
- Bronze main and crank bearings.

CHOICE OF 30 SIZES AND TYPES IN 5 TO 40-TON PRESSES



No. 4B





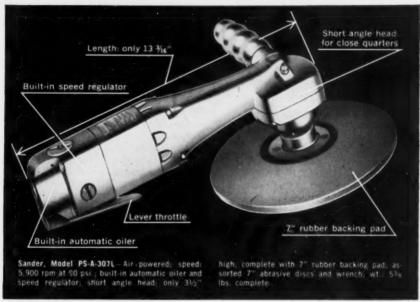


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ROUSSELLE PRESSES ARE SOLD EXCLUSIVELY THROUGH LEADING MACHINERY DEALERS
For more data circle 443 on Postpaid Card

POWER to boost job efficiency with REMINGTON tools





Pelisher, Hodel 47P - 8" bonnet; free speed: 1400 rpm; load speed: 840 rpm; 115 or 230 volts; heavy-duty ball bearings; wt.: 12 lbs.; with eye-bolt for reel suspension.



Reversible Screwdriver, Model PSDR-204P — Airpowered; reverses with a flip of a lever; adjustable clutch sets screws within 5% of set torque; speed: 1500 rpm at 90 psi. Remington delivers mobility and all the power you need to help cut production costs. With Remington you can standardize on the industry's widest selection of power tools—air, electric or gasoline-driven—with parts and service from one source. For free booklet describing the complete line of Remington Contractor and Industrial Tools mail Readers' Service card or see your local Remington distributor.

Remington,

Remington Arms Company, inc., Bridgeport 2, Conn. IN CANADA: Remington Arms of Canada Limited, 36 Queen Elizabeth Blvd.. Toronto, Ont.



For more data circle 444 on Postpaid Card

new shop equipment

Descriptions of new machines, tools and materials for metalworking.

HOBBERS AND SHAPERS

A complete line of gear shapers in seven different models and two lines of versatile hobbing machines in a total of seven models are announced by Michigan Tool Co., 7171 East McNichols Rd., Detroit 12, Michigan.

The new machines are United States versions, with important modifications, of the Lorenz line produced in Western Germany. All of the machines are available conforming to J.I.C. standards and carrying U. S. electrical equipment and controls. They are marketed and serviced under the name "Michigan-Lorenz".

The standard gear shaper line comprises four models for gears up to about 20 inches in diameter. In addition, there are two models designed for shaper cutting of closed gap type herringbone gears and a seventh machine designed particularly for cutting of racks up to about 6 feet long. Shorter racks can also be cut on some of the standard gear shapers.

The two series of hobbers are designed primarily for versatility and accuracy. The machines essentially are of the heavy duty type, one series for medium size gears and another for large sizes. All are vertical single spindle types, ruggedly built, extremely accurate to meet present day industry demand for accuracy, and with a versatility making them ideal for either

fairly large or job lot runs. All of the models are available with or without automatic loading and unloading.

The Michigan-Lorenz line of gear shapers is intended for fully automatic or semi-automatic production of spur and helical gears of both the internal and external type, racks, sprockets and other special profiles. On all the gear shapers, tapered teeth cutting attachments are available to permit the cutting of relieved coupling gears. This attachment, mounted on the work table, carries out the generating movement with its own indexing drive, controlled by the machine.

Rack cutting attachments are available on Michigan-Lorenz Gear Shapers. These attachments are direct driven by the generating feed through a lead screw and nut. The attachment mounts on the table of the machine and permits cutting of racks with either straight or tapered teeth. To facilitate shaping of cluster gears, a simple attachment locates the cutter for shaping a second gear in relation to the first one cut by simply moving a handle. A swiveling support arm supports the clamping arbor and pinion shafts.

Hydraulic clamping is available for high production requirements. The pressure of springs is used for clamping and this pressure is automatically released at the end of the cycle through the hydraulic device, for rapid change of workpieces, providing a safe

and shop materials

Edited by L. L. BALDHOFF

new shop materials

method for clamping the work. To switch from production of spur gears to helical gears, the straight guide in the ram spindle is replaced by a helical guide, the lead of which corresponds to that of the cutter to be used.

The standard line of Michigan-Lorenz Vertical Gear Hobbing Machines includes seven single frame models. The machines are of the universal type with high versatility. They consist of a high-capacity series (Models E-16 through E-40) with stationary work tables and movable hob stanchion for size adjustment and infeed; and the medium capacity series

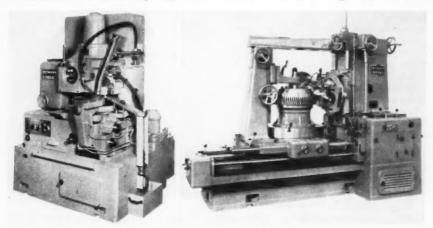
(Models E-9, E-9A and E-12) designed for maximum gear diameters of up to 3 and 4 feet.

Noted for precision of output, all of the hobbers are single spindle type and designed for both conventional and climb hobbing, including power infeed. For more data circle 101 on Postpaid Card

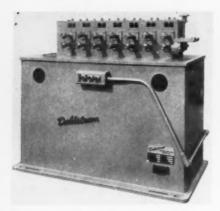
* modern machine shop

ROLL FORMING MACHINE

An addition to its line of roll forming machines is announced by Dahlstrom Machine Works, Inc., 4227 West Belmont Ave., Chicago 41, Ill. This



(Left) the Michigan-Lorenz Gear Shaper and (right) Michigan-Lorenz Gear Hobber



Dahlstrom Model 150 Roll Forming Machine

small roll forming machine, called Model 150, was designed to complement present roll forming or production facilities. It is especially practical for roll forming operations such as moldings, weatherstripping, curtain rols and so on.

Welded steel construction is featured with spur gear design. Spindles, mounted on anti-friction bearings are hardened and ground. Roll diameter range is $2\frac{1}{2}$ to $3\frac{1}{4}$ inches. Horizontal C-C distance is 5 inches. It is available in either open front, as illustrated, or in the outboard type.

Many other sizes are available for other types of operations. For more data circle 102 on Postpaid Card

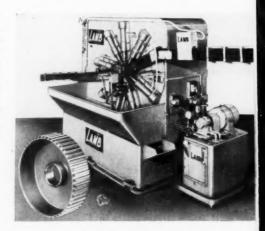
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MACHINE DRILLS 4,320 HOLES PER HOUR IN TRANSMISSION PARTS

Nine 0.090 inch diameter oil holes, equally spaced around the periphery of automatic transmission clutch hubs, are drilled simultaneously by a new machine designed and built by F. Jos. Lamb Co., 5663 East Nine Mile Rd., Detroit 34, Mich. The production rate is 480 parts per hour. Machine operation is completely automatic; an operator is not required.

Parts are gravity fed to the machine load mechanism, in Lamb FabriFlex chuting. A hydraulic cylinder strips each part out of the load mechanism and moves it forward into drilling position. Two gear teeth straddle a single guide rail which provides radial positioning for hole locations. The hydraulic cylinder also acts as a clamp during the drilling operation. A disappearing locating pin, in the center diameter of the part, provides a bearing surface for machining thrust.

Nine spindles are mounted radially on the vertical face of the machine. They are electrically driven and hydraulically fed. Feed stroke and return, for all nine spindles, is controlled by a single circular cam. Upon completion of the drilling cycle, the load-clamp cylinder and the locating pin retract, dropping the part into an unload chute for movement to subsequent



F. Joseph Lamb Machine drills nine 0.090 inch diameter oil holes arround periphery of transmission clutch hubs at 480 parts per hour.

operations. Provision is made to retract the spindles an additional 4 inches for

tool change.

The drilling operation can be performed with or without coolant. A removable tub and screened basket are provided for fast chip removal. An electrical pushbutton panel permits manual machine cycling. Hydraulic components are manifold mounted to minimize piping and facilitate service ease. All hydraulic, electric and pneumatic components conform with J.I.C. standards.

For more data circle 103 on Postpaid Card

* modern machine shop *

LAPPING MACHINES

The Spiralap line of flat lapping machines, offered by Micromatic Hone Corp., Detroit, Mich., is designed to eliminate the manual work characteristic of hand lapping, while providing extreme precision on flat work surfaces. Any mechanic can productively generate lapping accuracy within one light band (0.0000116 inch) on this equipment.

Quality control is maintained through the ability of the Spiralap to relap its own plates. In reconditioning the plates, the Spiralap mechanizes the hand lapping method of having three laps of identical size lapped one to the other in sequence. This technique eliminates any need for condi-

tioning rings.
In actual p

In actual practice, only the plate on the machine is lapped with the successive plate when reconditioning is necessary, inasmuch as the three plates supplied with each machine are lapped and mated at the factory. The relap procedure takes only a few minutes and assures a plane surface as true as one lapped by hand.

The Spiralap design offers a combination of: a lapping plate with a spiral groove filled with abrasive compound; two (or more) adjustable work



SPL-9A Spiralap Bench Model Machine

locating arms to effect rotation of the workpiece by the lap; and two timers to control the work cycle and to total the use-time of the lapping plates between conditionings. As the plate rotates, a steady supply of compound moves between the workpiece and the plates, inducing consistent abrading action.

For more data circle 104 on Postpaid Card

modern machine shop *

SADDLE CONTROL FOR GRINDER

A saddle control for its No. 1 Precision Grinder is announced by Taft-Peirce Mfg. Co., Woonsocket, R. I. Important saddle control changes have been made to increase the versatility and tenth-splitting performance of the No. 1 Precision Surface Grinder. Flat steel pedestal ways have been replaced by roller ways, a special anti-backlash crossfeed screw and nut assembly has been designed and protective dust-guards have been incorporated between table and saddle. These changes have resulted in an improvement in both



New saddle control for surface grinders

accuracy and time saving. The machine operator can now sidewheel grind slots and shoulders without risk of saddle creep and without locking the saddle in position.

The new saddle control is offered as standard equipment on all new machines and a complete modernization kit is available which allows present users of the No. 1 Precision Surface Grinder to install the new saddle control on existing machines.

For more data circle 105 on Postpaid Card

* modern machine shop

ELECTRIC IMPACT TOOL

A ½ inch drive heavy duty electric Impactool is announced by Ingersoll-Rand, 11 Broadway, New York 4, N. Y. It is known as the Size 5U-HD Impactool. With it, mechanics can capably handle the toughest nuts and bolts. The 5U-HD Impactool is the answer to the increased requirements of assembly and maintenance work—its heavy duty power quickly does the job. In spite of this heavy duty power bonus, the Size 5U-HD is both light



Ingersoil-Rand Size 5U-HD Impactool

in weight and it is easy to handle. The extra strong hammer case nose of the 5U-HD is built to last, and the rubber nose cap effectively keeps dirt out and prevents scuffing. A sturdy socket retaining pin in the square driver is through-hardened for long

life; positive retention also features easy replacement without special tools. The dirt resistant, heavy duty switch is totally enclosed for trouble-free service. Steel inserts in the housing provide greater gripping area for the screws, which hold the hammer case to the

motor housing and greatly decrease wear.

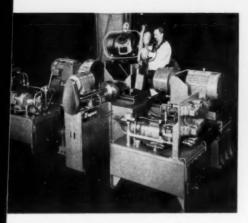
The Size 5U-HD Impactool is 10¼ inches in length and weighs only 6 pounds, 4 ounces less cable. Side to center distance is 1 7/16 inches. The tool delivers 1,900 impacts per minute, and runs at a free speed of approximately 1,900 r.p.m. It is available for 110 or 220 volt operation a.c.-d.c. (25-40-50-60 cycle) and is approved by Underwriters Laboratories, Industrial Type.

★ modern machine shop ★

For more data circle 106 on Postpaid Card

HEAVY DUTY 20 H.P. FEED UNITS

The accompanying illustration shows a installation incorporating new heavy duty 20 h.p. feed units introduced by



Installation features Zagar Feed Units

Zagar, Inc., 23898 Lakeland Blvd., Cleveland 23, Ohio. With this installation, three drill patterns are drilled by each of four drill heads. The changeable patterns are made by removal of the non-operating drills when casting and fixture are changed from one job to another.

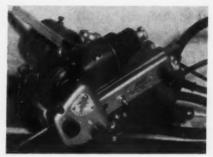
Accommodating more than one pattern of drilling and tapping is allowed for when designing the machinery in development stage. The drill heads are located in the form of a cross, the casting being drilled from four sides simultaneously. A total of 108 holes is drilled.

For more data circle 107 on Postpaid Card

* modern machine shop

AUTOMATIC TORCH

Arcair Co., Dept. 216, Lancaster, Ohio, anounces its Model Q-3 Automatic Arcair Torch, which uses an electric arc to melt metal and, simultaneously, a jet of compressed air blows the molten metal away. The unit consists of a head with an electrode feed mechanism which feeds consumable copper coated carbon-graphite electrodes, as required, and supplies a



Model 2-3 Fully Automatic Arcair Torch

jet of air at the proper location. The head is mounted on a tractor, permitting straight line or circular travel at predetermined speed. Where work is positioned, the Q-3 head can be removed from the tractor and mounted on the positioning equipment in the same manner as an automatic welding head.

The Q-3 will provide the steel fabricator, shipvards, pressure vessel fabricators and so on, with a compact portable automatic unit which will make precision grooves or cuts of any desired depth or angle. It enables production of "J" groove plate preparation by butting plate edges together and "U" grooving two plates in one operation. "Hogging out" operations are a natural for the Model Q-3, especially on the hard-to-cut alloys. In short, it is a highly versatile portable unit to perform all mechanized grooving, deseaming, plate edge preparation and similar applications. The unit can be mounted on suitable fixtures for grooving seams of rotating vessels.

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* modern machine shop

MACHINING CALCULATOR-MANUAL

Designed to provide technical information in a simplified form to anyone

involved in the computation of metal removal problems, a machining calculator-manual, of value to the machine tool engineer, estimators and process engineers, as well as shop supervisors, machinists, apprentice and vocational students of the trade, is now

being marketed by John A. Hedrick, Box 143. Parkerford, Pennsylvania.

The major contents of this manual consists of two vinylite plastic dial type instruments. One instrument is a Machinability Selector, which provides average speeds and feeds for various conditions of setup rigidity. This information is provided separately for tungsten carbide tools and separately for high speed steel cutting tools. The

other instrument is a Machining Calculator, which is used to compute the information provided by the selector to arrive at cut time and pieces per hour. Included as part of this manual are material data sheets, work sheets and a set of instructions to provide a simplified standards system

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★ mms

MICROMETER

To meet the need that gage, instrument, precision manufacturers and machine tool makers have for a micrometer capable of providing super accurate measurement.



Sheffield Micrometer

TICKLISH FINISHING JOB? do it better with a Paramount Felt Bob

If you have a tough polishing, buffing, lapping or de-burring finishing problem where tolerances must be held close, solve it by putting a Paramount Bob on the job. Seven custom shapes, 42 sizes, four degrees of hardness from soft to rock hard—there's a Paramount Bob ideal for every close-quarters precision finishing job. For example:



MICRO-FINISHING

Paramount Felt Bobs make ultrafine finishing of surfaces quick, easy and economical.



DIE AND MOLD MAKING

Thousands of die and mold makers depend on Paramount Bobs to perform precision finishing and buffing operations. Ideal for removing burrs without destroying close tolerances.

JOBBER INQUIRIES

NEW BOB ASSORTMENT KITS

K-1 Assortment includes 24 mandrel mounted bobs, 36 small wheels, touch-up pads — 66 pieces all together — packaged in one convenient bench top box. (K-2 Assortment also includes four sticks assorted polishing compounds.)

These handy assortments provide bobs of just the size, shape and hardness you want — and at \$10.95 (K-1) and \$12.95 (K-2) they are far below the cost of buying bobs separately.

See your jobber or write for literature

BACON FELT CO.

457 Water St., Taunton, Mass. INVITED
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200 modern machine shop

June, 1959

SHELDO

for the size Lathes You Need Most

Sheldon lathes are built in the sizes you need most, for toolroom and production iobs. They are available with swings of 10", 11" and 13". . . in varying bed lengths with 18" to 48" center distances . . . and . . . in your choice of pedestal, cabinet or bench

Powerful, all-V-belt, drive units-either the standard 8-speed (or 16-speed) E-drive; or the production favorite, a rapid, levershift U-drive. Where higher spindle speeds are desired, the standard E-drive can be built to provide speeds up to 2,000 r.p.m.

All Sheldon Lathes have handscraped, built-in precision. Each lathe is guaranteed to meet or surpass the American Standards

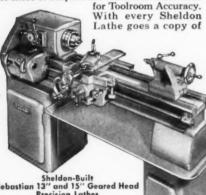


performed on that lathe. (19 checks).

Important optional features include: hardened bed ways, L00 Long Taper Key Drive spindles, 4" D1 Camlock spindles, bed turrets, taper attachments and a complete line of toolroom and production accessories.

The new Sheldon-built Sebastian Geared Head Lathes have greatly increased work capacity and many advanced features. These include a wide, heavy, hardened and ground bed . . . easy shifting spindle speed dial . . . 60-pitch gear box . . . independent drop lever apron clutches . . . cam-action tailstock clamp . . . and, automatic lubrication in the headstock and apron with

"1-shot" lubrication of carriage.



Sheldon-Built Sebastian 13" and 15" Geored Head **Precision Lathes**





SHELDON Horizontal Milling Machine 12" Shaper

SHELDON

SHELDON MACHINE CO., Inc.

Builders of Sheldon Lathes, Milling Machines, Shapers and Sebastian Lathes.

4250 North Knox Ave., Chicago 41, III.

Send in coupon or write for catalogs and names of negrest Sheldon and Sebastian Distributors where you can see these new lathes in operation.

SHELDON MACHINE CO., INC. 4250 North Knox Avenue, Chicago 41, Illinois

Gentlemen: Please send new catalogs describing:

- Sheldon | 10", | 11" | 13" Lathes Sebastian 13" and 15" Geared Head Lathes
- Horizontal Milling Machine Name of Local Dealer ☐ Sheldon 12" Shaper ☐ Have representative Call

Company Name

☐ Company
☐ Home Street Address

City For more data circle 446 on Postpaid Card

State

and dimensional inspection, The Sheffield Corp., Dayton 1, Ohio, has developed an ultra-precise micrometer that is accurate to plus or minus ten millionths inch per inch.

The micrometer has a 4 inch diameter barrel for ease of reading. It is available for delivery in two standard size ranges: 0.1 and 0.2 inches. The

PERFORMANCE

micrometers can be made to suit individual requirements with graduations on the satin finish thimble and barrel arranged for reading right or left, normal or reverse.

The lead screw, nut and barrel of each micrometer are calibrated as an integral unit at the Eli Whitney Metrology Laboratory, and the serial number registered.

Two other micrometer models of this type are also available. One is

made to an accuracy of plus or minus 0.000015 per inch and the other to plus or minus 0.000020 per inch.

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* mms

IRON WORK-

The No. 56 Little Blacksmith, manufactured by The J. F. Kidder Mfg. Co., Inc., 426 Colchester



specifications

- Capacity 5" rounds,
 10" flats
- Height (closed) 30"
 Blade length 7'5" x
- 1/2" x 23 ga.

 Blade Speed 45, 90 and 150 ft. per min.
- Motor 1/3 H. P., any voltage with 25' ext. cord
- Traction Wheels solid, rubber tread, 12" dia.
 Built-in blade, cord and tool compartment.



NEED IT!

The right saw in the right place pays for itself—fast! The Johnson Model M metal cutting band saw eliminates all hand cutting. It will cut anything on the job including time and labor costs. Completely portable, mounted on big rubber-tired wheels, it handles easily and it's simple to operate. Preferred by contractors because it's built to last, can be used indoors or out and so economical to buy and operate.

Write today FOR ILLUSTRATED CATALOG OF ALL JOHNSON SAWS AND ACCESSORIES



Little Blacksmith



1011 Barnes Street Albion, Michigan For more data circle 447 on Postpaid Card

All-New Precision Stewart-Warner PORTABLE BALANCER

Engineered for precision balancing of all rotating machinery. 1. Stroboscope and meters mounted in same partable head for easy one-man operation. 2. Removable, lightweight electronic unit for easier balancing in confined spaces. 3. Electro-magnetic pickup can be placed on machine part, freeing operator's hands.





cuts maintenance costs by enabling you to eliminate even smallest vibrations!

Stewart-Warner's new portable balancer is priced to make it economical for even small shops to own their own balancing equipment. Its portability permits easy in-place balancing and vibration analysis of assembled machinery. Indicates angle and amount of unbalance... determines rpm and amount of vibration. Helps produce finer finishes and closer tolerances... aids in reducing noise and worker fatigue... permits quality control before equipment is put in operation or shipped to a customer.

Also: a complete line of permanently installed cradle type balancers to meet every job type or short run precision balancing requirement.

Mail coupon for full details!

STEWART-WARNER	CORPORATION
Industrial Balance	r Department

Dept. YY-69, 1850 Diversey Parkway Chicago 14, Illinois

Please send me your Industrial Balancer catalogs.

Name

Company

Address

City

Zone State

For more data circle 448 on Postpaid Card

Ave., Burlington, Vt., is a versatile machine, as it has attachments for punching holes up to 2 inches in diameter, shearing and notching angle iron up to 2 by 2 by 3/16 inch and cutting off bars 3/16 thick by 3 inches wide.

Attachments are quickly changed from one to another. The machine is of all steel construction. It has a 6 inch air cylinder, operated by a four way foot valve, so that the operator has the use of two hands for faster production. The machine operates on 80 to 100 pounds air line pressure.

For more data circle 111 on Postpaid Card

* modern machine shop

SOFTFACED HAMMER

R. W. Hughes Industries, Inc., 2713 Ludelle, Ft. Worth 5, Texas, announces the Safe-T-Grip Hammer which is of one piece aluminum die cast construc-

> tion. The I-beam, finger - fitting handle permits perfect balance for safer and less tiring work.

The tips attach to a tip-bar that floats within the hammer. Even with the tips loose, there is no danger of stripping threads. Tips are available in various hardnesses and colors. ranging from soft to extra hard. The non - sparking materials designed for safe use everywhere.



CHICAGO® BENDING BRAKE



Many standard sizes are available with capacities for bending mild steel up to 12 feet by ¼ inch or 16 feet by ½ inch.

The elimination of die costs and the ease of changing from one job to another make the CHICAGO bending brake the economical method for bending steel plates for weldments. An automatic stop regulating the degree of bend assures duplication on successive pieces.



For details on how to do it, ask for Bulletin P-55



Press Brakes · Straight-Side-Type Presses · Press Brake Dies
Hand and Power Bending Brakes · Special Metal-Forming Machines

DREIS & KRUMP
MANUFACTURING CO.

7418 South Loomis Boulevard, Chicago 36, Illionis For more data circle 449 on Postpaid Card



Safe-T-Grip Hammer

NEW IMPROVED HARD FACING

Tough, hard ceramic coatings provide superior bearing surfaces

Sprayed alumina forms "sapphire-hard" surfaces highly resistant to wear, abrasion and corrosion. Ideal for bearing surfaces, seals.

Development of the new METCO THERMOSPRAY GUN for spraying highmelting-point ceramic materials at low cost opens up a variety of new practical applications. One that has produced a great deal of interest is the use of sprayed alumina coatings for bearing surfaces and mechanical seals. This Thermospray 101 Ceramic Powder produces surfaces with a hardness of 9.0 on the Moh scale, (only the diamond rates 10.0) with excellent resistance to wear, abrasion and corrosion. When used in combination with special phenolic or furane plastic sealers it provides superior protection against many acids.

Another Thermospray Powder – 201 – is zirconia which is somewhat softer than No. 101 but provides superior heat-insulating properties. Melting point of this material is 4600° F. and particle hardness 8.0 on the Moh scale.

Hard-facing alloys of the self-fluxing, nickel-boron-silicon type in powder form can also be applied with the METCO Type P THERMOSPRAY GUN. These coatings may be fused, semi-fused, or left unfused depending on the hardness desired, from RC 30 to RC 65, depending on the alloy and the process used.

The new THERMOSPRAY GUN operates without compressed air, only oxygen and acetylene being required. The free-flowing THERMOSPRAY powders are fed to the flame nozzle from a hopper atop the gun, melted and propelled to the surface to be coated. These materials are sprayed many times faster (up to 15 sq. ft. per hour—.010" thick) than has been possible with equipment previously available. Deposit efficiencies are in excess of 95%. These factors result in extremely low coating costs.

Preliminary engineering data contained in Bulletin 127 covers ceramic coatings while Bulletin 126 covers the hard-facing alloys. Either or both may be obtained by filling out the coupon below or writing on your company's letterhead. No obligation, of course.

THERMOSPRAY.

Total in the property of Metallizing Engineering Co., Inc. Metco., Thermospray.

*Reg. U.S. Pat. Off.



Pump rod sprayed with alumina provides superior protection against abrasion and corrosion

A A LITTING	Please send me □ free Bulletin 127 (ceramic coatings) □ free Bulletin 126 (hard-facing).	
Metallizing	Name	
Engineering	Title	Company
Co., Inc.	Address	
1177 Prospect Ave. Westbury, L. I., New York	City	Zone State

The Full Floating Assembly allows the user to relocate, reposition or rotate the tip to equalize the wear and prolong the life of the tip.

The Safe-T-Grip Hammer is available in one and one-half inch diameter, one pound weight, and in the two inch diameter, two pound weight.

For more data circle 112 on Postpaid Card

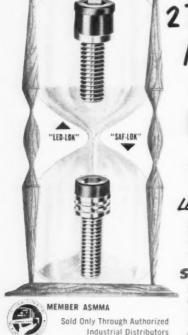
INDEXING MECHANISMS

Geneva Motions Corp., 1114 Northeast Cleveland St., Clearwater, Fla., announces a complete line of Geneva Motions, known as Tangen Drives. They provide a way of converting rotary to intermittent or indexing motion.

Precision machined, these drives index to speeds up to 2,000 indexes per minute. Indexing is smooth and positive in either direction. Locking

after each index is accurate within one thousandth of an inch. External Tangen Drives are available in any center distance from 1 to 24 inches and to in dex to any given number of stations.

The manufacturer states that the main cause premature wearing out of a Geneva Mechanism is improper entering of the cam follower at the start of each indexing cycle. Tangen Drives index without knocking. For more data circle 113 on Postpaid Card



2 Time-Proved Answers To Vibration Problems!

Blue Devil

positively will not loosen under any vibration. They're also air, water, gas-and oil-tight.

SAF-LOK SOCKET SCREWS have same exclusive anti-vibration advantages as LED-LOK. Ideal for use with food and chemical equipment.

OTHER MEMBERS OF THE BLUE DEVIL SOCKET SCREW FAMILY

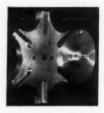
Socket Set Screws • Socket Cap Screws • Flat Head Cap Screws

Socket Shoulder Screws • Button Head Socket Screws • Socket Pipe Plugs

Dowel Pins • Socket Screw Keys & Kits

SAFETY SOCKET SCREW COMPANY

6519 North Avondale Avenue • Chicago 31, Illinois
Warehouses at: Los Angeles • Detroit • New Haven • New York City
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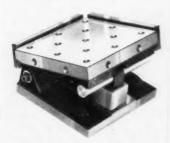
Above is Geneva External Tangen Drive

NEW SMALL SIZE

LOWER COST, FASTER ACCURATE ANGULAR SET-UP OF SMALL WORK



Magna-Sine (Model B-3-MS)
With 4" x 4" Working Area



Sine Plate (Model B-3-SP) With 4" x 4" Working Area

ROBBINS MAGNA-SINE

This new smaller Magna-Sine has all the time-saving, accurate angular set-up features found in larger Robbins Magna-Sines. Small to medium size work can now be set up in minutes instead of hours and with a lower investment in equipment. Magna-Sine table has a strong, fine pole, permanent magnet chuck that firmly holds small work without distortion.

ROBBINS SINE PLATE

Robbins small Sine Plate is manufactured to the same high standards of accuracy as the Magna-Sine. This precision makes it ideally suited for angular inspection set-ups. The ground surface of the non-magnetic table has tapped holes for convenient clamping of any work. Also, sturdy construction makes this small Sine Plate extremely suitable for light machining operations.

Compound angles are quickly and easily set up with this Robbins equipment by combining either two Magna-Sines, a Magna-Sine with a Sine Plate, or two Sine Plates. Now, with lower initial investment, every shop can secure accurate angular set-ups for small work. With Robbins equipment, you do a better job, faster and at less cost.

OMER E.

11961 DIXIE AVENUE

Kobbins

COMPANY

DETROIT 39, MICH.

For more data circle 452 on Postpaid Card

GRINDING TOOL FIXTURE FOR SINGLE POINT THREADING TOOLS

Cavic Eng. Co., 1313 West Essex Ave., Kirkwood 22, Mo., announces a tool that enables lathe operators to grind and sharpen 60 degree included angle threading tools quickly and accurately. Internal, as well as external, tools and any size up to and in-

cluding 3/4 by 3/4 can be accommodated.

All proper relief is incorporated into the fixture, thereby insuring smooth finish on threads cut in all types of metals.

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* modern machine shop *

GEAR MOTOR

New England Gear Works, 557 South End Rd., Southington, Conn., announces a gear motor that provides

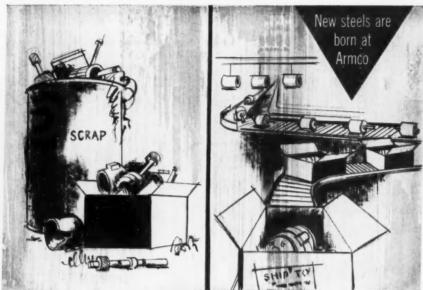
tremendous power in a small space. Built for heavy, continuous duty, this new type gear motor lends itself well for use in vending machines, business machines. pumps, conveyors, machine tools and so on. Smooth and quiet, it can be obtained at any single speed from ½ to 1,000 r.p.m. with torques up to 1/20 h.p. and 175 inch pounds at 10 r.p.m. This unit is built for long life and hard usage with ball bearing motor, generated gears and pinions of





Electric Motor Unit

How to change from



THIS to THIS

If excessive rejects are sending part of your profits to the scrap pile instead of the bank, it will pay you to get in touch with your nearby distributor of Armco Stainless Steels. Here's why:

Armco produces eleven *free-machining* grades in a complete range of sizes to efficiently meet a wide variety of special requirements. These might be strength, hardness, surface finish, corrosion resistance, and cold forming characteristics, all combined with faster production.

For the solutions to unusual or especially tough problems, call on your nearest Armco Distributor. If you don't know his name, write us at Armco Steel Corporation, 1709 Curtis St., Middletown, Ohio.

ARMCO STEEL



Armco Division • Sheffield Division • The National Supply Company Armco Drainage & Metal Products, Inc. • The Armco International Corporation • Union Wire Rope Corporation • Southwest Steel Products

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hardened steel and with large felt oil reservoir touching every journal. All gear assemblies are copper brazed. The unit can be either base or panel mounted. Totally enclosed with continual airflow over the motor, the unit features 115 volt, 60 cycles, a.c. Special cycles and currents are available.

For more data circle 115 on Postpaid Card

COOLANT STOPS RUST AND RANCIDITY

A water-soluble metalworking coolant, that the manufacturer states stops rusting, resists rancidity and reduces the threat of dermatitis, is introduced by S. C. Johnson and Son, Inc., Racine, Wisconsin.

Called Cold Stream, the product is said to stay clean for weeks, even when used on cast iron. Since the coolant does not hold dirt in suspension, the

problems inherent in dirty coolants are eliminated.

The product is said to provide superior finishes and extend tool life.

Surface - active agents are used in the formula to reduce surface tension and bring the solution in close contact with metal surfaces. enabling the product to cool even more effectively than water. This permits substantial increases in speeds and feeds, in many cases beyond the capacity of the machine.

Cold Stream has a combination of anodic and passivating rust inhibitors to guard against both electrolytic corrosion and atmospheric moisture. It does not contain a bac-



SCHAUER
MANUFACTURING CORP.

and other secondary finishing work

on metal and plastic parts. Many

4501 Alpine Ave., Cincinnati 42, Ohio For more data circle 455 on Postpaid Card tericide. The product is neither a sodium nitrite nor a soluble oil, but is formulated to provide the best cooling and lubricating features of chemical and oil types of coolants.

For more data circle 116 on Postpaid Card

* modern machine shop

PARTS BINS AVAILABLE IN 24 MODELS

Designed for orderly indexed storage of an endless variety of parts, the

parts bins announced by Bay Products, Inc., 1825 Cambria St., Philadelphia 32, Pa., are now available in 24 different models.

Bin dividers, drawer dividers and shelves are all adjustable to make the maximum use of available space. The forest green baked enamel finish blends well with any color scheme and is applied over an iron phosphate rust



These Parts Bins are made by Bay Products

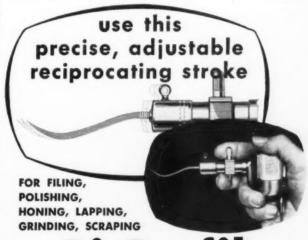
inhibitor for lasting durability. Construction is all steel.

For more data circle 117 on Postpaid Card

* modern machine shop

AUTOMATIC REVERSING SWITCH FOR DRILL PRESSES

Homestrand, Inc., 9 Addison St., Larchmont, N. Y., announces that the Swedish Arboga Drill Presses can now be fitted with an automatic reversing



THE Di-Profiler

Flexible Shaft RECIPROCATING TOOL

Saves costly hours of tedious hand labor on concave, convex and flat surfaces — and especially on hard-to-reach details of dies, molds, tools. The fast, precise reciprocating action can be varied from 0 to 100 strokes per second, with length of stroke from 0 to ½ inch. Moderate in price, the Di-Profiler, with its many versatile accessories, pays for itself quickly through time-saving cost reduction.

Write for free demonstration or illustrated price list DS-69

ENGIS EQUIPMENT COMPANY 431 South Dearborn Street, Chicago 5, III.

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switch for tapping. The reversing point is selected by means of a control knob. The attachment is disconnected electrically with a switch when the machine is to be used for drilling. Since the Arboga reversing switch is activated by the rotation of the feed shaft, it can be adapted to most other makes of drill presses as well.

For more data circle 118 on Postpaid Card

HIGH-SPEED

LOW-COST

KEYWAYS

POWERFUL MAGNETIC BASE INDICATOR HOLDER

A powerful magnetic base holder, whereby the magnetic field can be turned on and off by merely pushing the control button, is introduced by Cullen Mfg. Co., Racine, Wisconsin.

In addition to the on and off feature, this unit comes complete with all necessary attachments to accommodate all types of dial and test indica-

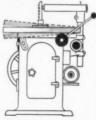
tors. The unit is precision ground on both sides, as well as the bottom. It incorporates a "step" across the top for attaching to rounds. A highly important feature is the precision adjustment which permits zeroing in of the indicator by merely turning the adjusting screw. This unit is known as the Erick - Magna-Holder, Model 375.

For more data circle 119 on Postpaid Card



WITH DAVIS KEYSEATERS!

You can cut accurate, low-cost internal keyways at minimum cost with Davis Keyseaters. Here's why: (1) operation is designed for production speed; (2) machine sets up easily, does not require skilled operator; (3) maximum concentricity of the keyway in each bore assured; (4) Built in 2 sizes. Keyways range from $\frac{1}{16}$ " to 1". High speed steel cutters stocked in all sizes; (5) the best keyseater of its type, yet inexpensive! Write now for FREE DETAILED LITERATURE!



Tilting table sets easily for tapered keyways up to 3" per foot.



Erick Magna-Holder

BAVIS KEYSEATER COMPANY

DIVISION OF Hansford MANUFACTURING CORPORATION
1239M University Ave., Rochester 7, New York
For more data circle 457 on Postpaid Card

POWER QUILLS

New high speed production performance for grinding, milling and finishing is announced by Precise Products Corp., Racine, Wis., with the introduction of three new power quills. The power quills-Models Super 55. Super 55D and Super 65—with speed ranges from 20,000 to 45,000 r.p.m. permit work tolerances to within 0.0001 inch on all types of metals, including the

hardest alloy steels, as well as plastics, wood and

glass. Models Super 55 and 55D, with 1/3 h.p., provide low cost precision machining for applications involving high precision production milling of small parts, accurate grinding carbide micro milling of both very hard and very abrasive materials. Model Super 55 uses

Super 55 Power Quill

type "S" collets with a maximum capacity of 3/16 inch. and Model 55D is equipped with a precision drill chuck having a range of 0 to 0.157 inch. Model 55D is specially suited for rapid, very accurate small hole drilling.

For similar high speed production applications, the powerful Model Super 65 offers full load speeds from 25,000 to 45,000 r.p.m. with a ½ h.p. motor, and uses type "P" collets with

Do your machine operators have this **EXACT KNOWLEDGE?**

With COMTORPLUG they read hole size to a fraction of a "tenth"

Thereby they can exert timely control over their machines to -

- eliminate rejects.
- improve quality.
- · increase production.

The cost is reasonable, making it practical to equip everyone who needs the **EXACT KNOWLEDGE of automatic 2**point gaging of precision bores: showing diameter, tapers, ovality, barrel shape.



USERS LIKE THESE DEPEND ON COMTORPLUG

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Ford Motor Co. General Electric Co. Humilton Standard Division Division Harris Seybold Co. Homelite Corp. Int. Marvester Co. Jacobs Mfg.

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SEND FOR BULLETIN 50-

COMTOR COMPANY, 64 FARWELL ST., WALTHAM 54, MASS.

For more data circle 458 on Postpaid Card

a maximum capacity of ½ inch. The manufacturer claims that the higher horsepower rating and the larger collet capacity permits use of the Super 65 on applications requiring heavier material feeds and faster material removal.

For more data circle 120 on Postpaid Card

HYDRAULIC PUMP

A variable delivery 5 g.p.m. vane pump is available from Vickers, Inc., Detroit 32, Mich. The pump includes an integral pressure compensator, which controls pump volume at preselected adjustable pressures.

Designed for pressures up to 1,000 p.s.i., the pump limits its delivery to system demand. Maximum delivery can be limited by a mechanical adjust-

ment. Pressure compensation can be varied from 200 to 1,000 p.s.i. Sharp cut-off characteristics enable the pump to deliver nearly full volume up to the compensator setting, even at low operating pressures. Variable volume and pressure compensation features eliminate the necessity for a relief valve and attendant piping. The pump is ideally suited as a fluid power source for varying volume demand circuits. Nominal 5 g.p.m. rating is at 1,800 r.p.m. For more data circle 121 on Postpaid Card





The Vickers Hydraulic Vane Type Pump



For more data circle 460 on Postpaid Card

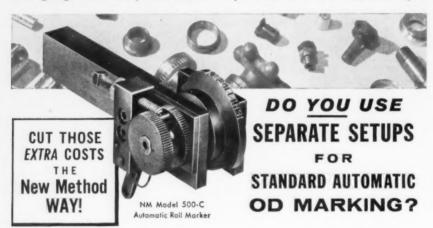
ADJUSTABLE VEST POCKET SCRAPER AND BURRING TOOL

Titan Tool Supply Co., Box B, 1419 Hertel Ave., Buffalo 16, N. Y., announces a tool that offers to the machinist a handy vest pocket scraper and burring instrument in which the cutting edge can be fully retracted for



Handy Scraper and Burring Instrument

carrying. The cutting blade can be adjusted to any required cutting length up to 3 inches. The blades are sym-



Other New Method Automatic Marker Models

NM Model 700—the cut-off marker for custom OD marking.

NM Model 900—Super automatic roll marker for most types of radial end-face marking.

NM Model 600-E-for end-face marking.

★ There's a New Method automatic marker for most marking and identifying requirements, each designed for a specific need.

★ New Method also manufactures a complete line of manually operated marking devices.

Advantages of Model 500-C

- Eliminates need for separate setups
- Provides easy die change
- Automatic reset
- Adjustable stop for accurate starting position
- Assures uniform depth of impressions on parts
- Drag or scoring of part prevented by starting pad guards

* Write TODAY for 500-C brochure



NEW METHOD STEEL STAMPS, INC.

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CLEVELAND STANDARDIZED PUNCHES

- Save on inventory. By using the Cleveland System you can punch ANY size hole from 1/8 to 11/16" with the SAME coupling nut and punch stem.
- **2** Pay LESS for Cleveland punches made in quantity, no stock wasted.



E. 40th and St. Clair Avenue, Cleveland 14, Ohio

Offices

NEW YORK DETROIT CHICAGO PHILADELPHIA EAST LANSING CINCINNATI

- 3 Get MORE wear per punch due to Cleveland's continuous research with new steels, alloys and processes.
- A Save time on delivery. 400 sizes of 21 standard panches −5% to 1½" ready for prompt shipment from stock.

Backed by years of experience in the manufacture of small tools for the fabricating industry, we are constantly experimenting with new steels, alloys and processes to give you the very best tools. Furthermore, in addition to the standard Punches and Die, we can furnish special sizes and shapes to meet particular requirements.

Write for Catalog No. 12

AA-6335

For more data circle 462 on Postpaid Card

metrical on each end so that they can be used interchangeably. They are fully removable to simplify resharpening. They are made from top quality high speed steel for long life between sharpenings.

This tool is particularly well suited for burring operations in the aircraft industry and other shop operations. The overall length of the holder is $4\frac{1}{2}$ inches; the blade is 3 inches.

For more data circle 122 on Postpaid Card

★ modern machine shop ★

DRILL HEAD

Increased productivity in handling multiple hole drilling operations on cumbersome parts is effected by a new attachment for adapting large multiple

> spindle drilling and tapping heads to radial drilling machines.

United States Drill Head Co. Burns St., Cincinnati 4. Ohio, has combined an air counterbalance and 360 degree ball bearing swivel attachment for this purpose. Thus, the high versatility of the company's numerous sizes of universal joint adjustable multiple spindle drill heads (as well as fixed center) can be added to any radial. The resulting flexibility provided





U. S. Drilling Head

For more data circle 463 on Postpaid Card

BUY the tools most LARGE COMPANIES USE to GRIND: RADIUS - ANGLES

THEY ALL CAN AFFORD AND DO HAVE MORE EXPENSIVE TOOLS. BUT FOR ACCURACY. EASY SETTING THAT CUTS ERRORS. AND LOW COST THAT IS EASY ON THE BUDGET. (ONE PLANT HAS OVER FIFTY), THEY BUY THE "MIGHTY MIDGET LINE" TOOLS.

RADIUS DRESSER \$44.00

ANGLE DRESSER \$49.00



ORDER DIRECT on our 10 das money back guarantee



Chatter Resistant, Spring Loaded Spindle

Hardened shaft-bearing adjustable for wear. Diamond always perfectly centered. Easily set adjustable 180° stops. All surfaces ground true from hole.

CAPACITY—1'4" convex to 4" concave.

10" Wheel size for DoALL and NORTON

Grinders—\$49.00. Diamond \$8.00. 14". 20". 24", in stock, low price

The "Mighty Midget"

SPERMAN METAL SPECIALTIES 2199A E. 21st ST. BROOKLYN 29, N. Y.

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Also send Blue Prints for Estimates on screw machine products and centerless grinding.

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PORTER MACHINE CO. CINCINNATI 9

OHIO

30 YRS. SERVING INDUSTRY

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- Layout Plates
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- Straight Edges Parallels

Lawley Surface Plates are made of hand-lapped black granite from 4" x 6" x 1" to 8' x 20'. Accuracies to .00005".

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Unexcelled in Quality and Performance since 1903!

Ball Thrust Bearing.

Lapped Housing.

Dresser

24 Precision Ground Surfaces.

DIAMOND BLOCK Slides in Ground &

Set Accurately with Protractor or Sine Bar to 1" of Arc.

Largest Bearing Surfaces of any Angle

HIGH SPEED FLAT TWISTED & ROLLED SECTION

HI-DUTY Flat-Twisted and Rolled Section Drills are produced by forging and hot twisting bars of ferging and hot twisting bars of high speed steel. This method improves the structure by preserving the grain of the steel. Sizes range from ½" to 3¼" and larger. Milled type drills are also available—from ¼" to ½" diameter. Hi-Duty means long lasting economical service!

SPECIAL DRILLS

We manufacture a large variety of special types of high speed drills - special diameters; lengths; step drills. FAST DELIVERY. We can make immediate shipment from stock on many special drills! Contact your industrial Sup-plier or write today for Catalog and Price List. Inquiries from representatives distributors invited.

HI-DUTY DRILL WORKS

Division of Hi-Duty Industries, Inc. FLEETWOOD, PENNA

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June, 1959

modern machine shop

219

the combination of the radial, the swivel and the universal joint head is said to afford many cost reducing factors in drilling structural steel, tube sheets, flute sheets, condenser sheets and other out-size parts. The attachment not only provides operating economy due to its flexibility and ease of adjustment, but also insures maxi-

The Clark Hardness Tester

is precision built to give

guaranteed precision results.

Thousands of Clarks, with

years of service all over the

includes the precision Clark

Diamond Cone Penetrator.

as well as Steel Ball Penetrators, a wide assortment of Anvils, Test Blocks, and other accessories. Available in two models, for Standard and Superficial "Rockwell" hardness testing, each with choice of 8", 12", or 16" work

The surprisingly low price

world, attest to this.

capacity.

mum safety for the operator and the machine.

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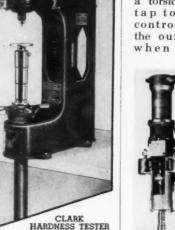
modern machine shop

TAPPING ATTACHMENT

The Model 100 Tapspeedster Drill Press Attachment is announced by Smith Mfg. Co., 208 St. Clair Ave., Cleveland 13, Ohio. The Tapspeedster is available with adapters to fit all standard drill presses. It is fast,

> will tap a 1/4-20 hole 3/8 inch deep, allowing a three thread lead on the tap at 1,200 r.p.m. This is 80 s.f.p.m. and the tapping cycle is completed in 7/10 second.

The manufacturer states that, when set correctly, the Tapspeedster will never break a tap. The tape is driven by a torsion spring, tap torque is controlled the ounce and. when the tap



10204 FORD ROAD DEARBORN, MICH., U.S.A.

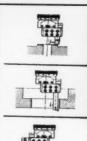
THE MOST FOR YOUR

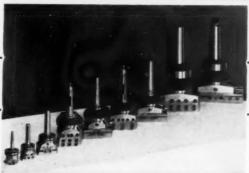
"ROCKWELL TESTING"

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Before you invest in any hardness tester, get the facts about the low price, speedy delivery, and guaranteed accuracy of the Clark. Write today. CLARK INSTRUMENT, INC.

Model 100 Tapspeedster Attachment











NOW! Cut Costs! Use Highest precision WOHLHAUPTER Facing and Boring Masterheads Facing, Boring, Turning, Recessing, Undercutting, Underfacing and Tapercutting

- · Automatic Feeds
- · Automatic End Release
- 9 Sizes for Work to 361/4"
- 12 Feeds in Larger Models

Also Tapercutting Heads for 0-180°

FREE! For illustrated catalog containing complete technical data, write today!

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and

Counterbores

Selections by the THOUSANDS

STYLES • DIMENSIONS
RANGES • SELECTABILITY
STOCK ITEMS • NET PRICES
WHY BUY SPECIALS?

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Box 429-M

LIBERTYVILLE, ILLINOIS

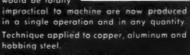
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COLD EXTRUSION

Here At Last!

Intricate Shaped Cavities are Produced by Cold Extrusion to Precision Accuracy

Cavities that would be totally



lower cost-closer tolerances.

Send drawings of your designs for quotation to:

ANTON MACHINE WORKS

1226 FLUSHING AVE., BROOKLYN 37, N. Y.

For more data circle 470 on Postpaid Card modern machine shop 221

hits an obstruction, the torsion spring is wound, making an electrical contact. This automatically reverses the tap approximately one turn before letting it proceed normally.

The Tapspeedster is said to lengthen tap life, since the torsion spring absorbs shock loads. The machine completes the required tapping cycle automatically; it does not require skilled operators. The Model 100 Tapspeedster uses standard taps to tap any material that can be drilled by high speed drills.

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modern machine shop

15 TON O.B.I. PRESS

A deep throat model of the Press-Rite 15 Ton O.B.I. Press with 12 inch throat depth is announced by Sales

> Service Mfg. Co., 2361 University Ave., St. Paul 14C. Minnesota.

The frame of this press is a rugged steel weldment with heavy reinforcement at the points of strain. This construction is said to provide maximum rigidity when the press is operated at full capacity. The 12 inch throat depth makes it possible to do many trimming, drawing,





15 Ton O.B.I. Press



BARRY B MOUNT

SOLD THROUGH INDUSTRIAL
DISTRIBUTORS

PLEASANT STREET, WATERTOWN 72, MASSACHUSETTS
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REDUCE Set-up Time and the need for expensive jigs & fixtures

HART MILLING FIXTURES

"Masters of A Thousand Set-ups"

Write for illustrated Folder Value proved by years of use.

WALTER W. FIELD & SON, INC.
39 Hayward St., Cambridge 42, Mass.



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FASTER set-ups and positioning

You save set-up and positioning time with Gilbert rotary tables. *Hand-indexing*: 36" and 50" square or round. *Power rotary* and *power feed*: 36", 50", 60", and 72" square or round. Special tables built to your requirements. For complete descriptions and specifications, write for Bulletin 854.

THE CINCINNATI GILBERT MACHINE TOOL COMPANY . CINCINNATI 23, OHIO

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CUT-MACHINING

Straight cuts in a few seconds. Two ends machined smooth as each cut is made. In many cases no further machining is needed. Figure your savings!



THE WALLACE WAY

Supporting and clamping the material on both sides of the cut (left photo, below) assures smooth, precision results in straight or mitered cuts. Wallace mounts the abrasive cutting wheel on a precision-ground, massively proportioned spindle (right photo) that stays accurate under conditions far more severe than normal service brings.





THIS DOES IT

This typical Wallace MODULAR Unit cutmachines tubing up to 6" O.D., solids up to 4". Six additional types of cut-machining units in the Wallace line for larger work, smaller work, automatic and manual operation.



GET THE CUT-MACHINING BOOK

'PHONE Joe Wheeler, COL-LECT . . . Call Chicago: BUckingham 1-7000

Tell Joe Wheeler where to send your copy. Discuss your cutting need. We pay for the call. **WRITE**, if you prefer, to



WALLACE SUPPLIES MFG. CO. 1804 W. Cornelia Avenue * Chicago 13, Illinois For more data circle 476 on Postpaid Card

new shop equipment . . .

forming, blanking and punching operations on metals, leather, plastics and so on, that would otherwise have to go on a larger press.

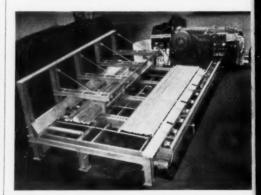
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* modern machine shop

BAR-BILLET SHEAR

The Hill Acme Co., 1203 West 65th St., Cleveland 2, Ohio, has developed a new type bar shear. Various installations and sizes are operating from low production hand feed machines to high speed fully automatic one man operations.

Shown in the illustration is the ultimate in high production automatic shearing. This installation was developed to shear up to 2 inch diameter high tensile material two pieces at a time—minimum 12 to maximum 50 inch long pieces to be cut with automatic disposal of scrap ends of bars. With the use of one operator, open bundles of bar steel are loaded on a yard conveyor and transferred automatically onto a cross chain magazine. With the use of an adjustable



Hill Acme Bar-Billet Shearing Machine



No. 2B POSITIVE TAPPER—capacity 3/6" to 7/6" in Steel.

No. 3A POSITIVE TAPPER—capacity 1/2" to 11/4" in Steel—1/2" to 3/4" Pipe Taps.

\$62.00 Write for Bulletin IMMEDIATE DELIVERY

Priced from

No. 4A TAPPER - capacity 3/4" to 2" in Steel including Pipe Taps.

. PRODUCTION THREADERS with Round Split . . . Button . Acorn Dies.

THRIFTMASTER PRODUCTS CORPORATION Division of Thomson Industries, for

1034 N. PLUM STREET, LANCASTER, PA

STANDARD UNIVERSAL ADJUSTABLE AND SPECIAL FIXED CENTER DRILLHEADS

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. No oxidation . No secondary operations

Totally enclosed head . . . for safety. Direct-over-center positive drive . . . gives more power.

One-piece 360° revolving head for fewer parts and longer life.

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HOGGSON & PETTIS MFG. CO.

New Haven 7. Connecticut For more data circle 479 on Postpaid Card

modern machine shop

scraper arrangement, bundles are broken down to single thickness for discharge onto a double grooved feed conveyor. Two bars feed off the conveyor to a predetermined retractable length gage, which automatically energizes the clutch on the shear, making one cut. As the bars are cut, two more bars are automatically discharged to the feed conveyor, producing 50 pieces of cut material per minute. With the use of an automatic hold down, bar kick is eliminated.

The company claims that high quality cuts, with a minimum of deformation, are possible with the unique outboard support.

As the pieces are cut, horizontal chains carry them to drop off chutes for deposit into reciprocating tote boxes and automatically stack the cut

pieces. After each tote box is filled with evenly stacked material, it is moved forward by an empty box, which starts filling without any interruption of the shear cycle.

The take-away system will accommodate three full and three empty boxes, which can either be placed in position or removed without stopping the cutting operation.

The manufacturer states that the entire operation can be overseen by only one operator at close to 100 percent efficiency.

Standardized sizes have been established in order to minimize the time that is required for change of length or diameter of bars.

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This new MORRISON **KEYSEATER** can make money for you

Install it in your shop. Its low cost will amaze you. Watch it pay for itself. You can quickly eliminate costly production tie-ups caused by waiting for expensive outside services. This is not an ordinary keyseater. The Morrison Keyseater is quality built with machine tool accuracy. Prac-



operate it. It has automatic feed, automatic stop to cut off feed at given depths, automatic relief to back the work away from cutters, away from currers, automatic centering, automatic lubrica-tion. NO BUSHINGS REQUIRED. Cuts keyways 1/16" to . FREE new Catalog 714-A shows all features and specifications can be had by writing:

tically anyone can

THE D. C. MORRISON CO. P.O. Box 10178

Cincinnati 1. Ohio For more data circle 481 on Postpaid Card

Troubled by Withdrawal Marks?

the new RELIEVOMATIC* saves you costly refinishing!

No more rejects or refinishing because of marred surfaces made by cutting tools on their return pass! Now—the RELIEVO-MATIC renders precise parts with perfectly smooth surfaces. For boring, turning or facing on automatic metal turning equipment.

Write for complete technical literature.





" U S Patent No. 2,712,767

normal marred surface | perfectly clear surface with RELIEVOMATIC!

SILBER PRODUCTS, INC. 870 ESSEX STREET . BROOKLYN 8, N. Y. Nightingale 9-8600

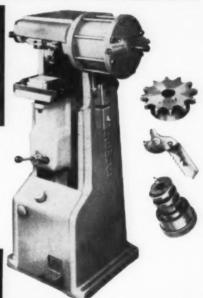
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1 MACHINE

Have a variety of parts to mark? Need equipment that's versatile enough to handle all of them? Then, you're talking about the Mat-thews' No. 240 Hydra- Pneumatic, General Purpose Marking Machine! Marks round. flat-even contoured parts.

Write today for Bulletin 146-C6.

3946 Forbes Ave. Pittsburgh 13, Pa



For more data circle 483 on Postpaid Card

1,600 DEGREE BOLTS

Standard structural fasteners for use at temperatures up to 1,600 degrees F. are announced by Standard Pressed Steel Co., Jenkintown, Pa. Offered in both airframe and engine bolt configurations, the fasteners are fabricated from any of four advanced metal alloys that have been intensively

studied in SPS laboratories. The development provides critical fasteners needed today for higher temperature. and thus more efficient, jet engine and rocket motor operation. They also provide structural fastenings for hypersonic airframes and missiles, whose speeds of up to 5,000 m.p.h. and more generate extreme surface temperatures.

Though developed primarily for aircraft, jet engine, missile and rocket needs, these fasteners presumably

> could find application in gas and steam turbines and related fields.

The bolts are rated at a minimum tensile strength of 155,000 p.s.i. at room temperature, 135,000 p.s.i. at 1.200 degrees and 85,000 p.s.i. at 1,600 degrees.

Rated minimum stress rupture life is 100 hours at 1,500 degrees and 10 hours at 1.600 degrees-in both cases with sustained load of 30,000 pounds per square inch.

For more data circle 127 on Postpaid Card



Structural **Fasteners**



Quality DE-STA-CO Toggle Clamps Check Quality ROSS Valves

Ross Operating Valve subjects every valve to a rigid pressure test. And for 15 years fixtures equipped with De-Sta-Co No. 620 plunger clamps have performed this critical sealing job.

What's your holding or fast-clamping operation-inspection, machining, tapping, grinding, welding, bonding, fastener assembly? There is a specific De-Sta-Co Toggle Clamp to do it better. Fast, positive clamping, long life in grueling production have made De-Sta-Co the leader for almost 30 years. And all medium and larger models use hardened serrated pins in hardened bushings staked to avoid turning and wear. Many spindle accessories increase versatility of the clamp you specify. Our stocking distributor in your area is ready to serve you. Send for catalog now. Also De-Sta-Co stampings, washers, spacers, shims, shim



Portable Clamps





Air-Operated Type

DETROIT STAMPING CO. 349 MIDLAND AVENUE . DETROIT 3, MICHIGAN

stock, feeler stock, blower housings, marine specialties.

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At new low price \$124.50 with diamond.

RADIUS DRESSER

outperforms them all Cut production time without sacrificing accuracy! Easy to set, easy to see, eliminates necessity of guard removal. Somerset Radius Dresser turns "tricky" jobs into routine operations.

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11/2-75 TONS

GREENERD, for 76 years, has manufactured Power-Performing ARBOR and HYDRAULIC PRESSES: maintenance-free: may be furnished to J.I.C. Standards, and designed to handle the following variety of work:

- " ASSEMBLING
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Write for Catalogue =656

Greenerd ARBOR PRESS CO.

41 CROWN ST. NASHUA , N.H.

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MARKING MACHINE

The Noble & Westbrook Mfg. Co., 25 Westbrook St., East Hartford 8, Conn., has developed a versatile and compact bench model marking machine with all pneumatic operation.

Designated as Model 509, this machine is ideal for marking round, flat or irregular pieces. It employs the Noblewest roll marking process that produces permanently indented inscriptions that last as long as the product itself.

Equipped with the Noblewest Duomatic Air Head, this machine is comparable to an air or hydraulic press with characteristic vertical ram travel. which provides the marking pressure. Depth of mark is controlled simply by air pressure, preset at the regulator. Incorporated in the Duomatic Air

> Head is an air operated die slide. which accommodates the roll marking tools and travels laterally to perform the roll marking operation.

Parts are placed on the work table and a single hand or foot control is depressed to initiate the machine cycle. which is as follows: pressure ram descends and applies marking pressure: slide travels



Noblewest Bench Model Pneumatic Marking Machine

400 Over 300 types and sizes of

PRECISION SURFACES



for LAYOUT, INSPECTION and **ASSEMBLY**

In Semi-Steel, Granite, Aluminum and Magnesium

Close tolerance precision work demands Precision Surfaces, and Challenge offers the broadest line of standard precision items to meet almost every precision need. This includes Angle Plates, V-Blocks, Straight Edges, Surface Plates and Floor Plates plus new lightweight Aluminum and Magnesium units. In addition, special types and sizes of precision surface equipment can be made to meet specific needs.



SE-116 A

Ask for catalog information including complete specifications and prices. See your Industrial Distributor or write Challenge today.

THE CHALLENGE MACHINERY CO. Grand Haven, Michigan

For more data circle 489 on Postpaid Card

left to roll in the mark; ram retracts; die slide returns and marking operation is complete.

For more data circle 128 on Postpaid Card

★ modern machine shop

MULTIPLE WHEEL PRECISION CYLINDRICAL GRINDER

An improved multiple wheel grinding machine, designated as Type IWR,

has been developed by Landis Tool Co., Waynesboro, Pa. It will grind two or more concentric diameters to extremely close tolerances on a production basis. This machine is available for complete automation or semi-automatic operation. It is made in 10 and 14 inch swings with 30 inch length between centers.

The wheel diameters are 36 inches. On the 14 inch swing machine, either 36 or 42 inch wheels are available.

when one second is vital . . . ROUSTRY In inspection or production of compound angles, only the NEW O.M.T. 12" and 16" fully optical rotary and inclinable table offers direct scale readings to one second of arc for both movements. 10 Twin eveniece facilitates reading of rotary scale in elevated position. Choose from a range of 9 hand and power operated tables from 10" to 30". Mfd. by Optical Measuring Tools Inc. DA Z H 0 ш ٥ HO Œ

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They'll be a Big Hit in Your Shop ...



partan_ BAND SAWS

Furnished in size and type for every cutting job including our New SAF-T HIGH SPEED BAND SAWS for Greater Cutting Value.

Sharp, perfectly milled teeth set with absolute evenness insures fast, smooth, clean cutting,

Write Today for Band Saw Bulletin 16. It May Help You

SPARTAN SAW WORKS, INC.

Stocked By



SPRINGFIELD, MASS.

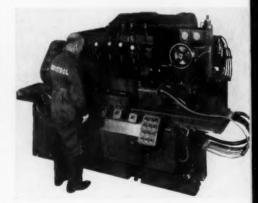
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new shop equipment . . .

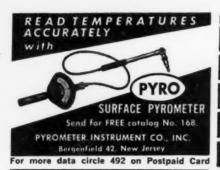
Parts such as crankshaft and camshaft line bearings, transmission shafts and components of jet engines are ground on these machines to precision limits. Diameters can be straight or profiled.

New concepts in grinding feeds, diamond dressing of the wheels and temperature control of the machine make it possible to grind multiple diameter work to extremely close tolerances. Setup time is reduced substantially and scrap is practically eliminated.

All hydraulic controls are mounted on a panel away from the bed. Hydraulic oil and coolant reservoirs are in separate tanks outside of the bed. Only the feed and traverse cylinders are within the machine. Coolant drains immediately from the wheel guard to its reservoir. This design keeps the machine at room temperature, minimizes machine growth and possible inaccuracies in machine alignment. For more data circle 129 on Postpaid Card



Landis Type IWR Cylindrical Grinder



NEW FLUSH PIN AMPLIFIER

OFFERS 5 to 1 AMPLIFICATION



· No dial indicator needed · No master required Extremely rugged • Speeds up inspection • .001 to .010 tolerance range. WRITE FOR DETAILS.

HOLMES GAGE & DEVELOPMENT CORP.

Columbus 3, Ohio

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Spin Your Rivets Faster



June, 1959

on the NOISELESS LINLEY RIVETER

Cut production costs with the Linley. Quickly produces finely finished rivets. Takes rivets up to %" in diameter in iron and cold rolled steel; even larger sizes in brass, aluminum and other soft metals. Send sample parts to be riveted and without obligation we will give you cost and time estimates of doing the job the easy Linley way.

Send Today For Bulletin R

LINLEY BROTHERS CO.

Also Builders of Jig Borers

671 State St. Ext., Bridgeport 1, Conn.

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DRESS

ABRASIVE BELTS FOR 30% LONGER LIFE





Unique Desmond Beltbrasive® dressers increase abrasive belt life 30% or more . . . give you "new" surface efficiency throughout belt life. Patented dresser quickly cleans out loaded belts, drums or discs on metal, wood or plastic jobs. One light pass when belt begins to load is all you need. Typical model costs less than \$7. Ask your Desmond distributor.

The only complete line of grinding wheel dressers and cutters

esmond

he Desmond-Stephan Mfg. Co. Urbana, Ohio

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233

modern machine shop

HIGH SPEED TAPPING ATTACHMENT

Tapmatic Corp., 845 West 16th St., Costa Mesa, Calif., announces the high speed Tapmatic "300A" Tapping Attachment, capable of continuous operation at speeds up to 2,500 r.p.m. Featuring an axial floating drive spindle and a supersensitive spring

loaded ball clutch, the "300A" was designed expressly to eliminate the hazards, human and mechanical, associated with conventional tapping equipment. Friction clutches, planetary gears and lead screws have all been eliminated in its construction. An operator of minimum skill can produce consistently perfect threads without any danger of tap breakage.

Necessary driving torque is quickly and simply adjusted prior to the actual tapping operation and cannot be

changed by the operator during the tapping operation. Reversing torque is automatically increased or decreased when driving torque adjustments are made. Tap stops instantly when it is dull. loaded or bottoms in blind hole tapping.

Designed to meet the need in industry for a rugged, compact, precision tapping attachment, the "300A" weighs



MACHINE PRODUCTS PRECISION EQUIPMENT

You'll hold closer tolerances and increase efficiency, too, when you use Machine Products precision surfaces. Because the combination of superior materials, skilled craftsmanship and rigid quality controls in the manufacture of Machine Products equipment assures you of the precise dimensional accuracies you require. A complete line of plates and accessories is available, so send for your free catalog today.

MACHINE PRODUCTS CORPORATION

6771 E. McNichols Rd. • Detroit 12, Michigan

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Tapmatic "300A"
Tapping Attachment

only 15 ounces, has a diameter of 1 27/32 inch and a length of $3\frac{3}{4}$ inches.

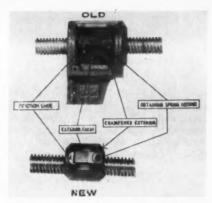
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* modern machine shop

NUT FOR DEPENDABLE CLAMPING ACTION

Wilton Tool Mfg. Co. Inc., Schiller Park, Ill., announces that its Rapid Titan Nut has been redesigned to provide an even greater degree of fast, dependable clamping action. The rivet used to fasten the retaining spring has been replaced by a self-tapping screw. The size of the friction shoe has also been increased, to provide a greater contact area with the threads and reduce the level of the noise that occurs when the spindle slides free.

In order to eliminate any possibility of binding, the nut is given a tumbled exterior finish and the corners are



Old and new views of Wilton Rapid Titan Nut

heavily chamfered. The improved design Rapid Titan Nut is used on all Wilton Rapid Titan C-Clamps, Drill Press Vises, Utility Vises and Woodworkers' Vises.

For more data circle 131 on Postpaid Card

NUMBERALL OUTS THE COST OF STAMPING HUMBERS

Numbering and Lettering Press Mono Wheel Automatic Spacer

Designed for the purpose of impressing Letters and Numbers in all kinds of Name Plates and Flat Metal Parts. The Dials 33/4" Diameter are made of Special High Grade Tool Steel, scientifically hardened and tempered. The Characters are carefully engraved and make clear cut impressions of uniform depth. Stan-

dard Dials are engraved with 40 characters. Character Heights as follows: 1/16, 3/32, 1/8, 5/32, 3/16". Different size Dials are interchangeable. Carriage Table advances one space with each impression of the Dial, like a typewriter, doing rapid work, even spacing and perfect alignment.

Plates up to 5" wide and 6" long can be stamped, but can furnish a longer Table and Rack if required. Depth of impressions is adjustable by a screw on bottom of machine. A direct sight gauge is provided, to facilitate stamping in the proper place. We can also make steel type with round face characters.

NUMBERALL STAMP & TOOL CO. HUGUENOT PARK STATEN ISLAND 12, N. Y.



For more data circle 497 on Postpaid Card

235

TUBE CUTTER

A high speed tube cutting machine produces up to 235 pieces of tubing per minute that can be flared without burring and is versatile enough for most materials, including plastic-impregnated paper. The precision machine was developed and engineered by the Novi Tool & Machine Co.,

25806 Novi Rd., Novi, Mich. The Novi Tube Cutter works on pieces as short as 1½ inches. In addition, the cutter holds this length to plus or minus 0.005 inch with parallel faces.

Designated as the Model 500, the unit is designed to cut tubing from ½ inch in diameter having a 0.028 inch maximum wall thekness to ½ inch in diameter tubing having a 0.060 inch maximum wall thickness.

In manual operation, tubing is hand fed through radius cut-off blocks to a

positive length stop. Operator starts the cut-off cycle by depressing a foot-operated control. The cut-off holding blocks automatically close in on the tubing, holding it rigid and positively positioned. Specially designed shearing knives cut the tubing. The holding block automatically releases as soon as the knives complete



Whether on high or low production runs, you can do precision tapping of multiple-hole patterns on a drill press at low cost with a U. S. Master Lead Screw Head. These special fixed center heads are built with varying number of spindles and tap sizes in any one head—with exact gear ratio required to each spindle as well as to master lead screw. Use on any drill press having a reversing spindle.

The cost-reducing production of precision multiple-hole patterns is OUR BUSINESS! Ask our engineers to talk with yours.





Novi Tube Cutter

HIGH-PRODUCTION TOLERANCE IN ONE PASS HOLE MILLS" P. O. BOX 990 BEVERLY HILLS, CALIF.

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JIG GRINDING and JIG BORING

to your specification

At your disposal: Our sub-contract jig boring department, one of the best equipped in the

A. K. TOOL CO., INC.

ROUTE 22, MOUNTAINSIDE, N. J. Telephone: ADams 2-7300

For more data circle 500 on Postpaid Card



For more data circle 501 on Postpaid Card June, 1959



DURANT Tool Supply Co.

9 Thurbers Ave. • Providence 5, R. I.

For more data circle 502 on Postpaid Card 237

modern machine shop

their cut. At work, the machine bed can be tilted backward in order to allow the parts to fall directly into the tote pans.

Ready accessibility of holding blocks and knives permits quick machine changeover for cutting tubing of various diameters.

For more data circle 132 on Postpaid Card

LATHE TOOLS

Kendex Tools for reworking mounted car wheel sets on Niles wheel turning lathes and Sellers tracer control wheel lathes, have been developed by Kennametal, Inc., Latrobe, Pa.

These tools, designed for indexable, clamped, throw away inserts, are made in five styles for Niles turret type and rigid tool block lathes, and in two styles for Sellers lathes. Tools for flange roughing and contouring tread

and flange are provided for left and right hand machining on these lathes. A special tool for removing mushroom rollover is available for the Niles turret tool block lathe.

Square inserts provide up to eight indexable cutting edges. Heat treated alloy steel toolholders are fitted with insert shims made of solid Kennametal for positive insert seating of the harder. more wear resistant grades of Kennametal used in the inserts.

For more data circle 133 on Postpaid Card



Kendex Throw Away Insert Type Tooling



QUICK, EASY PRECISION SEEING



Other models available for bench or machine mounting. Write for catalog.

A sensational aid for increasing production speed and accuracy. Already in big demand throughout industry for easy viewing of tiniest work details. Many profitable applications for your plant.

. Trade Mark

Provides Binocular vision for fine assembly, inspection, testing and all precision visual tasks.

6" x 6" optically ground acrylic lens. 36 sq. in. viewing area, free from distortion.

High light transmission with two 4W fluorescent tube Localite.

Lens and light independently adjustable. Frictional collar disc joints give flexibility for any position.

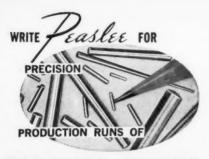
1/2" steel tubular stand finished in Hammerine Metallic Silver. Rubber feet. Size 12" x 10" x 9" high.

Available at Electrical Wholesalers and Scientific Supply Houses

Lamps not

THE FOSTORIA PRESSED STEEL CORPORATION FOSTORIA, OHIO

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TAPER PINS

DIAS. 9/0 to #4

As specialists in stainless-steel, instrumenttype pins, we offer quantity runs of standard size Taper Pins. Tolerances are held to .001 on dia. Sizes run from #4 down to 9/0, Send your blueprints for prompt quotation.

THE PEASLEE METAL PRODUCTS INC.

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Powerful Dependable and Economical **Fully Guaranteed**

Hundreds of different Model Combinations 1 to 12 ton Capacities



odel BT-5 5 Ton \$199.50 ess meter



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less motor

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CHICAGO MANUFACTURING AND DISTRIBUTING CO. For more data circle 507 on Postpaid Card

240

new shop equipment . . .

SPECIAL TWO STATION HONING MACHINE

Motor rotors are honed at the rate of 200 parts per hour on a special two station production honing machine, announced by Barnes Drill Co., 860 Chestnut St., Rockford, Ill. The rotors are constructed of laminated steel and vary from 3 to 4 inches in length in different lots. Required bore size in all the parts remains constant at 0.8750-0.8755 inch with a surface finish of 25 r.m.s. BarnesdriL tooling, designed for this critical honing job, is producing bores better than 0.0002 of size on diameter from bore to bore, while removing 0.0003 inch stock.

Two complete standard BarnesdriL Model No. 223 Vertical Type Honing Machines are mounted on a common base with a two station 180 degree rotary index table equipped with four fixtures. The two honing units operate independently or simultaneously, as the job requires. Changing the stroke on one unit to accommodate parts of a



Barnesdril Two Station Honing Machine



MARK OF QUALITY

S T A N D A R D



• The high quality and accuracy of Standard Steel Specialty Taper Pins have won them wide acceptance. Milled from bar stock, straight to taper and to extremely close tolerances, these pins give 100% performance. The uniformity and accuracy of the pins saves valuable time at assembly, assuring you trouble free service.

Write for complete catalog giving information on taper pins. Woodruff keys, machine keys and machine racks.

STANDARD STEEL SPECIALTY CO.

Plants: Beaver Falls, Pa.; Hammond, Ind.

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Patented Pivoting Trunnion, Safety-Slip and Support Blade prevent blade breakage and injury to operator. Fast adjustment to lathe center.

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AUSTIN TOOL CO., INC.

P. O. Box 6133, Austin 21, Texas

Few Industrial Areas Open for Distributors
and Representatives

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WHATEVER YOUR DRY MACHINING PROCESS-

Economical KETT "Mystic-Lube" Mist Coolant Generator



GIVES YOU ...

• Faster Operating Speeds

* PLANERS

* SHAPERS

- · Longer Tool Life
- Deeper Cuts
- Better Finishes
- Lower Costs

LEADER

FOR OVER

15 YEARS

- Flexibility
- · Portability
- Dependability

Mist dissipates in the air—cools by refrigeration principle. No special coolants, no moving parts—operates off any air line. Compact, all-in-one unit, one and four gallon size, has features non-available in many higher priced models. Quality designed for quick transfer, ease of maintenance.

KFTT

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THE KETT TOOL COMPANY

5048 Madison Rd. Cincinnati 27, Ohio

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different length does not interfere with the operation of the second unit.

Both of the units are equipped with electronic hone expansion and plugmatic automatic bore to bore sizing units.

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Production CHUCK

Will pay for itself in 60 to 90 days

On turrets, engine lathes, cuttingoff machines, drill presses or any
type of chucking machine, the
Barker Two-Jaw or Three-Jaw
hand operated chuck will increase
production up to one third and
actually pay for itself while
doing it in from 60 to 90 days.
Hand lever eliminates pneumatic and hydraulic systems yet closes and locks

matic and hydraulic systems, yet closes and locks jaws with lathe running or stopped. Over 30 years of labor saving, production boosting operation.



lathe is running

Write for bulletin 201 today.

THOMAS HOIST CO. 28 S. HOYNE . CHICAGO 12, ILL.

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Super Tool Miniature Carbide Drill

MINIATURE CARBIDE DRILL

The tiny drill shown in the illustration (on the dime "inflated" seven times) is just four times the thickness of a human hair, five times smaller than a dentist's drill and is twice as long as the dime is wide.

It is said to be the newest perfectly fluted, solid cemented carbide drill produced for industry's miniaturization program by Super Tool Co., 21650 Hoover Road, Detroit 13, Michigan.

The drill is manufactured to a diameter of 0.0135 inch for precision drilling non-ferrous and other abrasive



Multiform

Users report the Multiform Bender one of the handiest tools in the shop. No special tooling . . Bends, Cuts, Punches, Flats, Rounds into Any Shape, Brackets, Springs, Boxbars, Wire Forms, Aircraft Work, and Steel Rule Dies for Metal Blanking.

AIR OR HAND MODELS FOR UP TO

1/4" to 4" MATERIAL Write for brochure which illustrates and describes the four bender models.

J. A. RICHARDS CO.
Dept. 6-M Kalamazoo, Mich.

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Press Cams



Come to "Headquarters" for your needs All types of cams . . . box, barrel, face, side . . . and hardened and ground, for tough service. Get all the benefits that come frrom long experience and ex-Send drawings or specifications. clusive service. Ask for literature on Cam Millers and Grinders.

THE ROWBOTTOM MACHINE CO. P.O. BOX 4097, WATERBURY, CONNECTICUT

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For more data circle 514 on Postpaid Card

Speed production . . . cut costs with

INSTANT CHANGE



AUTOMATIC KEYLESS CHUCK

Lets you change tools in seconds without stopping the spindle. One chuck does the work of several spindles, won't chew up tool shanks. The greater the torque, the tighter the grip.

DRILL PRESS VISE

Floats and locks instantly, positively, in any position on table. Holds work safely for accurate drilling and tapping. Two models: 9" and 12" capacities.

Write for illustrated folder and name of nearest distributor to AMF Tool Division, American Machine & Foundry Company, 224 Glenwood Ave., Bloomfield, N. J.



WAHLSTROM®/FLOAT-LOCK® SAFETY VISES **AUTOMATIC CHUCKS**

For more data circle 515 on Postpaid Card

materials—like copper, aluminum and plastics employed for rocket and missile work, aircraft instruments, and epon glass used for printed circuits in the electronics field.

Highly wear resistant, it will produce hundreds of holes without size variations.

For more data circle 135 on Postpaid Card

modern machine shop

UNUSUAL NEW ENGINE LATHE

Clearing Division, U. S. Industries, Inc., 6499 West 65th St., Chicago 38, Ill., has introduced a new type of engine lathe. This new machine, called the Clearing-Axelson Blue Chip Lathe, is built to handle the tougher, high alloy materials which will appear with increasing frequency in the future. Higher speeds and greater horsepower available, as well as an increased range of speed selections, make this machine a most versatile lathe.

To achieve the rigidity necessary for the greater demands that carbide and ceramic tooling, with their correspondingly higher productivity impose, the

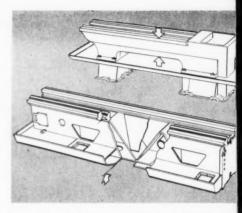


Figure 2-Cutaway of welded steel bed

Blue Chip Lathe is constructed by welded steel fabrication.

The building block principle is also used in the design of the Blue Chip Lathe. The headstock, which contains the drive and the operating controls, is built as a separate unit. It can be assembled to a lathe bed of any size. Future changes in customer requirements, regarding bed size or type, can be met by assembling the headstock to a new bed especially built to fulfill the new requirement.

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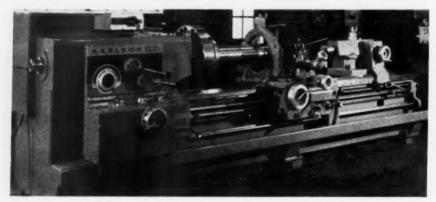


Figure 1—This is the all new Clearing-Axelson 2516 Welded Steel Blue Chip Lathe

HORIZONTAL SURFACE GRINDER

Aaron Machinery Co., Inc., Dept. M, 45 Crosby St., New York 12, N. Y., announces the Eagle Horizontal Surface Grinder, which is an accurate, yet moderately priced precision machine, indispensable in large or small workshops. It is quickly set and operated and can be used for all surface grinding operations and for jigs, fixtures,

press tools, cutters and so on.

Base: cast iron heavy box type. Knee: vertical movement is operated by handwheel through 2/1 ratio bevels. the movement being marked by 0.0005 inch graduations. Saddle: of sturdy design and fitted with 4 oilwells for constant table lubrication. Table: hand operated by 7 inch handwheel through helical

Eagle Surface Grinder

pinion and rack. The table runs in V-slides, adjustable by means of gib. Head: the grinding head is of heavy design.

The spindle is ground all over and dynamically balanced. It runs in precision taper roller bearings, thus giving long and trouble free bearing life without the need for constant attention to lubrication. All end float is said to be eliminated.

For more data circle 137 on Postpaid Card

DEPENDABLE MACHINE SUPPORT ... PRECISION LEVELING



Solid, easily adjustable foundation for machine tools, large surface plates, automation lines, tool room and production equipment of all types. Easily installed, they increase machine efficiency, reduce downtime and maintenance. Combined with Vi-Sorb Mounting pads, Empco Jacks reduce objectionable vibration to a minimum, retard creepage, often eliminate the need for anchor bolts. Built to take it, Vi-Sorb pads stand up under repeated impact . . . resist oils, greases, acids. Jacks available in 6 styles, 25 models. Pads to fit.

INQUIRE TODAY!

ASK FOR BULLETIN NO. 100

THE ENTERPRISE MACHINE PARTS CORP.
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Manufacturers of Automatic Production Machines, Fixtures, Machine Parts
For more data circle 516 on Postpaid Card





Get This Production Boosting
''TRICO-MIST''
COOLANT SYSTEM

With Flexible Armored Coolant Lines and Kwik-Change Nozzle With Guard



For drilling, tapping, milling, sawing, grinding, etc. Removes heat from cutting edges of tools and work. Feeds can be increased considerably, finer finishes and accuracy are obtained. TRICO-MIST absorbs heat, thereby quenching it faster than flood coolants which only transfer it. Chips slide freely up the tool face and are blown away automatically. Simple needle valve controls size and volume of mist spray. Attaches to shop air line. Available with one and five gallon containers—single or multiple outlets—single or dual valve control.

SEND FOR BULLETIN 37

TRICO FUSE MFG. CO.

For more data circle 517 on Postpaid Card

new shop equipment . . .

REINFORCEMENT BAR BENDING MACHINE

Wallace Supplies Mfg. Co., 1804 West Cornelia Ave., Chicago 13, Ill., announces the No. 92 Bar Bender that bends reinforcement bars to 23% inch round capacity at approximately 7 r.p.m. The power of the twin-cylinder drive is transferred to the shaft by super-strength roller chain. The manufacturer states that twin cylinders guarantee equal force for bending in either direction.

It is not necessary to turn the bar end for end in making double offset bends.

A speed control valve is provided to permit bending of hi-carbon bars.

The No. 92 Machine has a foot operated electric control with two pedals—one for right, one for lefthand bending.

A degree of bend selector has four adjustable stops in each direction of rotation. The stops can be preset for desired angles of bend.

A 30 h.p. motor may be wired for either 220 or 440 volt, three phase, 60 cycle, alternating current. Electric control circuit is 110 volts.

Floor space (no allowance for swing of bar) is 48 inches by 17 feet 5 inches. Weight is approximately 10,000 pounds

For more data circle 138 on Postpaid Card



Wallace No. 92 Reinforcement Bar Bender

DUST SEPARATOR

The Model 30 Cyclone Dust Separator, featuring an adjustable belt drive that provides a wide range of c.f.m. performance against varying resistances, is introduced by Torit Mfg. Co., Walnut and Exchange Sts., Dept. 712, St. Paul 2, Minnesota.

The high efficiency Model 30 includes a new radial blower, which delivers high performance at low h.p.

requirement. This self - cleaning blower wheel is located on the "clean air" side, so that bulky material and foreign objects are deposited in the base before the air reaches the fan, thereby eliminating risk of fan breakage.

The Model 30-FM is designed for outdoor exhaust. When it is desirable to save heat and recirculate cleaned air indoors, FB models are available. For more data circle 139 on Postpaid Card

* modern machine shop

GUN BORING MACHINE

The Boremation Gun Drilling and Gun Boring Machine, introduced by Drillmation Co., Inc., 6500 East Eleven Mile Rd., Center Line, Mich., has the



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... and it's full of SHORT RUN STAMPING TIPS!

IT'S A FACT—you can get better Short Run Stampings at less cost by putting into practice the many tips and economies outlined.



You'll want this fact filled Stamping Guide at your fingertips when planning new products, changing existing products or checking methods and procedures.

WRITE FOR BULLETIN 301 . . . and if you want immediate proof of Federal's ability to produce top quality stampings, send along a part, print or sketch for an Analyzed Quotation.

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For better stampings . . . better contact Federal

QUALITY STAMPINGS

FEDERAL

FEDERAL TOOL & MANUFACTURING CO. 3615 Alabama Ave., Minneapolis 16, Minn.

FEDERAL SHORT RUN STAMPING, INC. 915 Lyell Avenue, Rochester 6, N. Y.

FEDERAL STAMPING COMPANY
7315 Atoli Ave., No. Hollywood, Calif.

QUANTITIES 3 PLANT LOCATIONS
For more data circle 518 on Postpaid Card

Torit Model 30 Cyclone Dust Separator

June, 1959

modern machine shop

247



kipp

AIR GRINDERS



THE SPEED of Kipp Featherweight Air Grinders stays up where it belongs, under load, for efficient grinding even with small wheels. This may not be true with most of the "Plug-In" grinders you now are using.

HAVE YOU GIVEN your toolmakers a chance to save valuable hours by providing them with enough Kipp Featherweight Air Grinders and accessories?



MADISON-KIPP CORP.

208 Waubesa St., Madison 10, Wis., U.S.A. For more data circle 519 on Postpaid Card

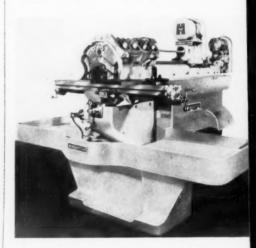
new shop equipment . . .

features and accuracy of a jig borer, resulting in an unusually versatile gun drilling and gun boring machine which can be used for many conventional applications.

This machine is not only capable of gun drilling or boring precise holes to specified tolerances in one pass from the solid, but the operator can position, space and hold the workpiece for new drilling locations without removing the workpiece, maintaining precise hole alignment and relationship.

Once the workpiece is clamped and held secure to the traversing table, subsequent operations like counter drilling, boring and chamfering can be performed in the one hole location; but, if the workpiece has a series of holes to be drilled in different locations, each new hole location can be located (and the tolerance held) with the easily read and operated hand dials. For extra precision, hole alignment, optics, measuring standards or dial gages are available.

For more data circle 140 on Postpaid Card



View of Boremation Gun Boring Machine

SAFETY MULTIPLE LOCKOUT

The Dayton Rogers Manufacturing Co., Minneapolis 7D, Minn., announces an improved safety multiple lockout.

This safety device is made from extra heavy duty ½ inch thick hard steel, eliminating the possibility of any type of tampering, and has been approved by safety committees where such equipment is considered a must. When two or more men are engaged at

a certain power source for any season, the switch box or control levers may be locked by one or more men. The power source can only be cleared when all such men clear their locks from the multiple safety lockout. Each man is provided with his own keyed padlock.

This serves as a definite personal means to lock out all power sources when it is necessary for such stoppage. When

Multiple Lockout

the last workman removes his personal padlock from the switch box the lines are then clear and the power source can be re-established.

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* modern machine shop *

THREE OUT OF FOUR AXIS MACHINE CONTROL UNIT

A machine control unit, which is designed for switchable simultaneous

FREE . . .
JUST PUBLISHED
24-PAGE BOOKLET



"HOW TO MAKE YOUR OWN MACHINE AND REPAIR PARTS QUICKER AND EASIER"

IT TELLS THE STORY OF ALL-PURPOSE

STRESSPROOF STEEL BARS

... the steel bars that replace maintenance steels, such as C-1018, B-1112, A-4140, plus most of the 125 different types on the market. You don't have to heat treat STRESSPROOF. It's strong, machines faster, wears better. Get the complete story...write for your booklet.

La Salle

STEEL COMPANY

1474 150th Street

Hammond, Indiana

Available from your Steel Service Center

For more data circle 520 on Postpaid Card

continuous control of three out of four motions of rigid, high accuracy four axis milling machines, is available from Industrial Controls Section, Bendix Aviation Corp., 21820 Wyoming Ave., Detroit 37, Michigan.

This machine control unit provides the normal three axis of control (longitudinal, transverse and vertical) standard to any milling machine, with the additional feature of being able to switch from a linear motion to a rotary table or tilting spindle. This feature facilitates the numerical machining of complex shapes such as turbine parts, cams, aircraft and missile bulkheads.

Command pulse values from the control unit to the machine tool of from 0.0002 to 0.000025 inch can be achieved with this control system.



Three out of four axis machine control unit

Because all four axes of machine tools are seldom in use simultaneously, this three out of four axis numerical control system is a practical and economical method of achieving four



BEVERLY SHEAR MFG. CO., 3000 W. 111th St., Chicago 43, III.

For more data circle 521 on Postpaid Card

axis control of machine tools. This system of numerical control provides an extremely versatile method of machining any number of different part shapes with only one machine tool. For more data circle 142 on Postpaid Card

* modern machine shop 7

TAPPING AND CUTTING OIL

An Aerosol Jet Tapping and Cutting Oil, developed by Crown Industrial Products Co., 1005 Amsterdam

St., Woodstock, Ill., is easy to apply on any job, in any position and it stays put. This oil clings to metal in any position. It cannot spill, will not drip and will not run off. It is easy and safe to carry in its protected spray can.

Available in 6 ounce or in the more economical 16 ounce can, Crown Aerosol Jet Cutting Oil answers the need for a heavy duty tapping and cutting oil where there is no builtin lubricating system.

For more data circle 143 on Postpaid Card



Crown Cutting Oil

HIGH SPEED BALANCING MACHINE

Gisholt Machine Co., 1219 East Washington Ave., Madison 10, Wis., introduces a complete line of high speed bench type balancers, specifically designed to handle miniature belt, air, or electrically self-driven parts or assemblies. Typical work includes miniature armatures, aircraft and missile gyros, small spindles, turbines,



Ask your mill supply house or Maxwell salesman or write today for CATALOG BB-159 Greater accuracy, more work in less time, longer tool use—you get them all with Maxwell's new Mastur Boring Head line.

Adjustable to 0.0001-inch, Maxwell's new improved boring tools feature an adjusting-screw head graduated for readings in thousandths, with body having vernier readings of 0.0002-inch. Four standard models for tools \%" to 1" diameter, and up to 3" in specials. Boring range from \%" to 15". AA-9872

MAXWELL INDUSTRIES, INC. 493 East 5th Avenue · Ashtabula, Ohio

Edsi Sili Avelloe - Asiliabola, Ol

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CAPACITY - MODEL 111

1,000 to 10,000 RPM or 2,500 to 15,000 RPM. Continuously variable speed con-

CAPACITY - MODEL 113

15 Speeds - 750 to 15,800

CAPACITY - MODEL 603

600 to 4,000 RPM with Variable Sheaves



Write for literature and prices.

THE ELECTRO-MECHANO CO.

265 E. Erie St. Milwaukee 2, Wis.

For more data circle 523 on Postpaid Card 252 modern machine shop

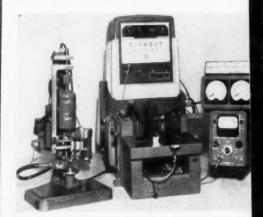
new shop equipment . . .

textile parts and so on. Both horizontal and vertical models are available.

Unbalances causing work support movements greater than 0.000002 inch, with the work rotating at any speed between 1,000 and 3,000 or between 4,000 and 12,000 r.p.m., can be quickly and accurately measured and located. Standard equipment includes an amplifier, a direct reading amount of unbalance meter and strobe lamp assembly to indicate angle of unbalance. Supports for work from 1/2 to 8 ounces or for work from 8 ounces to 10 pounds are furnished.

Operation is simple and does not require skilled personnel. The HS Balancers are designed for fast setup over a wide work range and special tooling for any job is simple and inexpensive.

Since the HS Balancers are bench type machines, they require no special mountings. Accuracy is not affected by extraneous vibrations or electromagnetic disturbances, including those set up by electrically self-driven assemblies. Regardless of workpiece weight or method of drive, unbalance



View of the Gisholt HS-1 Balancing Machine

can be measured and located to full machine accuracy (0.000002 inch bearing displacement) in two transverse planes, as little as ½ inch apart, with unbalance indications in one plane unaffected by unbalance in the other. For more data circle 144 on Postpaid Card

* modern machine shop *

DUST COLLECTOR

The Cincinnati Electrical Tool Co., 367 Mt. Hope Ave., Cincinnati 4, Ohio, announces the Type AIR-4 bag type dust collector.

The Type AIR-4 is larger than previous bag type dust collectors built by the firm. Powered by a heavy duty, drip-proof, 3 h.p. motor, the dust collector is designed for service with up to two 30 inch grinding wheels or two 18 inch buffing wheels. This dust collector is also particularly suited for recovery of gold, platinum or silver dust in the precious metals industry.



Cincinnati Electrical Tool Dust Collector

The AIR-4 has two 4 inch inlets with 6,000 f.p.m. velocity at each inlet. For more data circle 177 on Postpaid Card

NOW! A COOLANT WHICH ELIMINATES OFFENSIVE ODORS

NEW COOLBLUE "CAMPBELLENE"

—the Concentrate with MASK

GOOL BLUE CAMPBELLENE is a brand-new coolant concentrate, the first ever offered with odormask to drastically reduce offensive odors. Fully tested in both laboratory and field, COOL BLUE CAMPBELLENE is perfect for all abrasive cutting and most grinding operations. Only COOL BLUE CAMPBELLENE has all these big features:

- Exclusive ODORMASK keeps unpleasant odors to a minimum
- · Won't support bacterial growth, won't turn rancid
- · Increases wheel life through cooler, non-foaming action
- Provides rapid chip settling Prevents build-up of hard deposits
- Inhibits rust of machine and work
- Costs as little as \$.017 per gallon of coolant. 1 part Campbellene mixes with 150 parts water

ORDER DIRECT FROM FACTORY. Shipping direct from factory keeps costs down. 1-gallon can only \$3.90, 5-gallon pail a low \$17.50. We'll ship your CAMPBELLENE in 24 hours. Terms net 30 days, F.O.B. our factory in Bridgeport, Conn. Also quarter drums and 55-gallon drums for greater economy. Complete details and prices on request. ORDER TODAY!



CAMPBELLENE COOLANT

Allison-Campbell Division • American Chain & Cable Company, Inc.
931 Connecticut Avenue, Bridgeport 2, Conn.

For more data circle 524 on Postpaid Card



CAMS

MADE TO YOUR SPECIFICATIONS

—Except Screw Machine Cams— Design Assistance Offered

KIDDE PRECISION TOOL CORP.

For more data circle 525 on Postpaid Card

GRAYMILLS Mist Coolant Systems



"The Best in Mist"

Precise air and fluid controls, corrosion proof. Translucent containers let you see the liquid level. Write for new folder.

GRAYMILLS CORP.

3769 N. Lincoln Ave.
CHICAGO 13, ILLINOIS

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For more data circle 527 on Postpaid Card

Crystal Lake Rd.

Manufactured by
NORTHERN ILLINOIS MACHINISTS

modern machine shop

McHenry, III.

new shop equipment . . .



Numeric-Keller Tape Controlled Miller

CONTINUOUS, TAPE CONTROLLED MILLING IN THREE DIMENSIONS

Continuous automatic milling of regular and irregular shapes in three dimensions to a high degree of accuracy, under the direction of tapereading numerical control, is accomplished by the Numeric-Keller machine, introduced by Pratt & Whitney Co., Inc., 25 Charter Oak Blvd., West Hartford. Connecticut.

In this machine, the horizontal and transverse movements of the table on which the work is mounted, the vertical movement of the cutter spindle and the feed rates, are automatically controlled by punched tape. The operator is required only to push the button to start the tape, change the tooling as required and set the spindle speeds. The machine is ideal for both short and long run production, particularly in tool and die plants.

For more data circle 145 on Postpaid Card

* modern machine shop *

DIE HEAD

A combination "push-off"—"pull-off" die head series is available for Brown and Sharpe Automatics, turret lathes and other machines, employing a stationary type die head, from Landis Machine Co., Waynesboro, Pa.

Designated as type DE Landmatic, this series replaces the EXX style

Landmatic.

This series is available in two sizes, the No. 4 (½ inch) with a No. 4 to ½ inch range for application to No. 0, OG, 2 and 2G Brown & Sharpe Machines and the No. 5 (5/4 inch) having No. 4 to 5/4 inch range for use on

No. 2 and 2G Brown & Sharpe Machines. Auxiliary equipment allows the No. 4 head to produce threads on diameters up to 3/4 inch and the No. 5 up to 1 inch.

The DE Heads are designed to allow either the "pull-off" (internal) or "push-off" (external) head opening features to be used as desired without making head alterations. Pulloff action is obtained by interrupting the forward travel of the machine's slide, allowing the die head to advance by the



Type DE Landmatic Die Head

self-leading action of the chasers until head opening occurs. When using push-off action, the trip mechanism contacts a stop on the machine to effect head opening.

For more data circle 146 on Postpaid Card

modern machine shop

SPEED CONTROL VALVE

The "Cub," a lightweight speed control valve, is available from Ross



Exciting new best seller! Yours FRFF!

Wilton's new "book" is more than a catalogl It's actually a production know-how manual that shows you in-plant photos and operating case histories of how Wilton clamping tools (both manual and powered) have been used by the best brains in the business to save time and money. Of course we show our line, and that too is unique—Wilton has the most complete line of clamping tools in the world. Write for your copy now; it's an education that will pay dividends in your plant. No obligation, of course.

WILTON

WILTON TOOL MANUFACTURING CO. INC. • SCHILLER PARK, ILLINOIS
MMS-69

For more data circle 528 on Postpaid Card

GET UP TO 600% INCREASE IN STOCK REMOVAL RATE



GRIND AND LAP at the same time. Get lapping accuracy at grinding prices. Obtain finishes of 1 RMS; flatness and parallelism to 2 millionths of an inch... with metals, plastics and ceramics.

SPEEDLAP is a "lap-grinding" unit which uses a non-chargeable lap plate, also higher lapping pressures, to give greater and faster penetration.

Ask for cost and production estimates based on samples of your work. Job lapping services also available.



For more data circle 529 on Postpaid Card 256 modern machine shop new shop equipment . . .



"Cub" Lightweight Speed Control Valve

Operating Valve Co., Detroit 3, Mich. Available in ½ and ½ inch pipe sizes, the "Cub" offers a metering adjustment which permits five full turns from closed to full open position. A short installation radius and small envelope dimensions make the "Cub" ideal for limited space installations. It is designed to handle 0 to 150 p.s.i.g. air service.

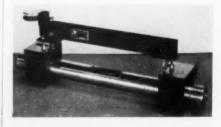
For more data circle 147 on Postpaid Card

* modern machine shop

ADJUSTABLE LENGTH MEASURING INDICATING GAGE

An improved i.d. and o.d. adjustable length measuring indicating gage is announced by Size Control Co., 2500 West Washington Blvd., Chicago 12, Illinois.

The gage may be changed from i.d. to o.d. by simply moving the indicator



Adjustable Length Measuring Indicating Gage

or rest pins to different positions in the gage. Standard units have a maximum measuring depth of 1.000 inch and a length range from 0 to 54 inches. Fixed i.d. and o.d. masters are available to set the gage.

For more data circle 148 on Postpaid Card

* modern machine shop

VERSATILE LINE OF BELT GRINDERS

A complete line of versatile, $2\frac{1}{2}$ inch belt grinders is introduced by Rockwell Mfg. Co., Walker-Turner Division, Dept. WE-22, 400 North Lexington Ave., Pittsburgh 8, Pa.

The line fills the need for low-cost machines to do fast, efficient grinding, buffing and deburring in commercial metalworking shops, plant maintenance shops, toolrooms and other industrial areas. Where they are used instead of wheel grinders, these vertices the statement of the property of of the pr



Walker-Turner 21/2 Inch Belt Grinder

satile grinders eliminate the bother of setup wheels and wheel dressing.

CAMS

Fully equipped modern machine shop with extensive Jig Boring, Surface Grinding, Horizontal Boring and Thread Grinding facilities as well as modern Cam Milling and Cam Grinding equipment.

Your Inquiries Answered Promptly

HIMOFF MACHINE CO., INC 23-16 44th Road Long Island City 1, N. Y

For more data circle 530 on Postpaid Card



For more data circle 531 on Postpaid Card



SHARPEN YOUR SAWS Automatically, In Gangs

Just think of it! 100 26 gauge saws sharpened at one time. Takes saws up to $5\frac{1}{2}$ '' dia. and $1\frac{3}{4}$ '' klick. Saws are automatically indexed and sharpened within a variation of plus or minus .001 of exact diameter of entire lot.

WRITE FOR CIRCULAR 35T

THE WARDWELL MFG. CO.

3803 Ridge Road Cleveland 9, Ohio

For more data circle 532 on Postpaid Card

300%...

MORE EFFICIENT

. . . Plus Greater Accuracy



Automatic machine shown also available as

Tests Prove Peerless Metal Cutting Band Saws are Over 300% More Efficient than Conventional Cut-Off Methods

Only Peerless has these big advantages:

- · Counterbalanced saw frame
- Automatic feed pressure control
- Compensating feed unit which automatically regulates blade pressure
- Saws at 100% efficiency at all times

Write for free literature



PEERLESS MACHINE CO.

RACINE, WISCONSIN

For more data circle 533 on Postpaid Card 258 modern machine shop

new shop equipment . . .

In addition to the four standard setups—single horizontal, double horizontal, horizontal and vertical, and double vertical—a variety of accessories is available which make it possible to build low-cost special job setups.

Engineered for long life and accurate work, the Walker-Turner Belt Grinders feature lubricated-for-life, double-sealed, preloaded ball bearings, precision bored seats, precision ground shafts and dynamically balanced arbor pulleys.

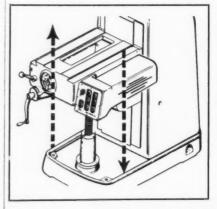
For more data circle 149 on Postpaid Card

* modern machine shop *

MILLERS FEATURE MOTORIZED KNEE

Famco Machine Co., 3122 Sheridan Rd., Kenosha 4, Wis., has added power feed to the knee on its $1\frac{1}{2}$ and 2 h.p. mills.

This feature offers the milling machine operator greater milling convenience and, also, a more precise method for deep precision boring without the possibility of tool runout.



Motorized knee on Famco Milling Machine

With the addition of power feed to the knee, Famco has a line of mills that has power feed in three directions —table, saddle and knee.

For more data circle 150 on Postpaid Card

* modern machine shop

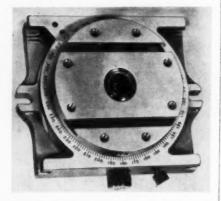
INDEX TABLE ACCURACY IN A SMALL MECHANISM

Designed for accuracy in a small space, an index table, announced by Calectron, Inc., 2444 Beverly Rd., St. Paul 4, Minn., provides 360 positive locking positions.

The positive indexing feature of this mechanism eliminates the need for careful visual settings which are usually found in devices of this small size. Position can be repeated within 2 minutes of arc.

This index table will provide the inspector, machinist and engineer with a very versatile means of inspecting, machining, measuring or laying out the small parts encountered in the field of miniaturization.

Carefully constructed of heat treated, lightweight alloy castings, this device is essentially rustproof throughout. This index table, measuring only 6 inches long, 5 inches wide and 15% inches high, can be mounted on



Calectron Index Table is a small mechanism



ADJUSTABLE DRILL JIG

eliminates layout

cuts drilling time



Used for drilling holes through round stock and hex stock from 1/4" to 2" and cap screws from 1/4 11/4", the new Mathewson Adjustable Drill Jig eliminates layout and can cut drilling time on small lots to a fraction. And it eliminates the costs of special jigs for larger quantities. . Holes for cotter pins, set screws, drive pins for bayonet joints, oil holes in tubular sections, and wiring holes in cap screws, are all typical of the operations that can be done more economically with this jig. Hole diameters range from .052" to .531", using your A.S.A. standard slip bushings. • The hardened V-block has two 60-degree V's for centering round or hexagonal stock, one for 1/4" to 21/32" diameter, one for 21/32" to 2" diameter. Adjustable stop for locating work longitudinally for drilling any distance from end, may be used on either side. Adjustable bushing carriers hold slip bushings and clamp work securely. . Jig highly successful in permitting use of inexperienced operators. For circular write to: Mathewson Machine Works, 40 Hancock St., Quincy 71, Mass.

For more data circle 535 on Postpaid Card



For more data circle 536 on Postpaid Card



NEW! Self-Centering 5C Collet Stop

Quick friction adjustment. Stays in fixed position. Will not distort collet. Will not move back. Also available for other collets and spindles. 30 Days Free Trial. Several Territories Open for Distributors. Write for Bulletin

BYCO INDUSTRIES

2200 Snelling Ave. Minneapolis 4, Minn.

For more data circle 537 on Postpaid Card

Allman Universal Hand Tapper 5 TIMES FASTER

A great time, labor and material saver. Fixture taps five holes to every one using the free hand method. Eliminates costly tap breakage.

CHECK THESE FEATURES:

- Articulate arm swings clear of large table for placement of work.
- Limitless number of sizes of tapped holes without moving work piece.
- Vise holds work as small as 3/8" square.
- Floating tap locates itself in hole.
- Individual spindle holds taps, thus change requires only seconds.



TOOLS,

1734 No. 25th Ave. - Melrose Park, III.

For more data circle 538 on Postpaid Card

new shop equipment . . .

machine tool or inspection bench in either horizontal or vertical position. For more data circle 151 on Postpaid Card

* modern machine shop #

DRILL HEADS

Fast, easy removal of spindles, bearings and related parts are features of the cartridge type spindle plate construction now available with Thriftmaster Universal Joint Type Adjustable Drill Heads. This new construction is offered on the full line of universal joint drill heads, manufactured by Thriftmaster Products Corp., 1034A North Plum St., Lancaster, Pa.

The new cartridge plate provides spindle rigidity and accuracy, while retaining the adjustable feature for application to various hole patterns. Removal of one lock screw permits the cartridge containing spindle, bearings and related parts to be removed from



The Thriftmaster Adjustable Drill Head

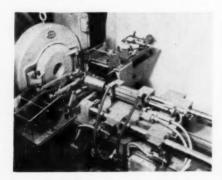
the plate as a complete unit. This eliminates many of the difficulties resulting from frequent assembly and disassembly of bearings and other parts.

Cartridge type spindle plate construction can be furnished with any of the standard, semi-standard or special universal joint adjustable drill heads. Spindle assemblies with the usual full ball bearing construction are standard. For close center applications, assemblies with bronze radial and ball thrust bearings also are available and interchangeable with the ball bearing assemblies. The illustration shows an eight-spindle head with the new cartridge type spindle construction.

modern machine shop

FEED ATTACHMENT INCREASES EFFICIENCY OF SWAGING MACHINES

The Fenn Mfg. Co., Newington, Conn., has developed automatic feeder and unloading accessory for swaging machines that is said to provide the nearest thing to automation in swaging. The operator simply places pieces to be swaged on a feeding rack and, from that point, the entire operation is completely automatic. Each piece is



Feed attachment for Fenn Swaging Machines

MUMMERT-DIXON SWING FRAME GRINDERS



Ask for Descriptive Circular
MUMMERT - DIXON CO.

120 Philadelphia St. * Hanover, Pa.

For more data circle 539 on Postpaid Card

JIG BORING

and

Large Precision Machining

Done to your specifications

We have 22 Jig Borers

KIDDE PRECISION TOOL CORP.

For more data circle 540 on Postpaid Card

TROYKE

ROTARY TABLES

New Design

Greater Precision

Greater Rigidity



6 Sizes . 8 Models

Guaranteed 60 seconds or less total accumulative angular error. (60 seconds equals .00087" at 6" diameter.)

Write for FREE Catalog Number 23.



TROYKE MFG. CO.

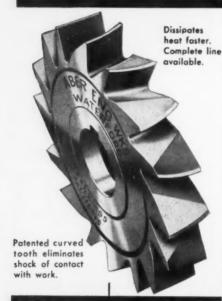
11296 Orchard Street
Cincinnati 41 (Sharonville), Ohio
For more data circle 541 on Postpaid Card

modern machine shop

261

June, 1959

Shearing Action LONGER RUNS with Curved tooth CUTTERS



ABER Curved Tooth PLUS FEATURES

- Give More Accurate Control of Limits and Finish
- · Elimination of Chatter and Breakage
- · Extended Cutter Life
- Better Performance
- Increased Production



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new shop equipment . . .

gravity loaded into the feeding mechanism, where it is automatically gripped and fed into the swager. After the swaging operation, it is retracted and the piece automatically ejected. Simultaneously, another piece is fed into the machine.

According to the manufacturer, this accessory greatly increases the potential of any swager as a production machine, assuring accurate work alignment, positive production control and greater capacity. Operator fatigue, associated with manual feeding, is also eliminated.

For more data circle 153 on Postpaid Card

modern machine shop

ROTARY INDEXING TURRET

Hammond Machinery Builders, Inc., 1615 Douglas Ave., Kalamazoo 54, Mich., announces the Model J21-4 Rotary Indexing Turret which is designed to produce high quality finishes at low unit cost. This machine may be used with one, two or three polishing,



Hammond J21-4 Indexing Rotary Automatic

buffing or deburring heads, as required, to produce a desired finish.

The Model J21-4 incorporates all the quality features of the standard Hammond Rotary Automatics, has an operating range of 250 to 600 indexes per hour and requires only four workholding fixtures.

A positive table lock is available for use on this turret for polishing operations or whenever all table movement must be eliminated during the working cycle of the machine.

For more data circle 154 on Postpaid Card



20 INCH BAND SAW

A 20 inch metal-wood cutting band saw, featuring a variable speed drive for cutting everything from stainless steel to aluminum, wood and plastics, is introduced by Rockwell Mfg. Co., Delta Power Tool Division, 606D North Lexington Ave., Pittsburgh 8,



The Delta 20 Inch Band Sawing Machine

Pa. Designed to fill the need for a versatile metal-wood cutting band saw to do heavy duty work in the foundry,

ZERO LEAKAGE GUARANTEE!

DUCAS Morse HI—SPEED FLUID TRANSFER GLANDS
FOR GUN DRILLING AND OTHER
HOLLOW DRILL APPLICATIONS

- Permits fastest, most efficient drilling available to industry
- SPEED 15,000 RPM (Higher if Required)
 PRESSURES to 1500 P.S.I. (Higher if Re-

quired)

Lowest HP requirements—Ex.: At 15000 RPM & 1500 PSI with a fluid flow of 4.7 GPM only 1.30 HP is required to drive MT-2-750 unit.

Taper Type

Complete line of Morse, Jacobs taper units, Spindle and Flange attachment units are now available for your special needs.

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TITLE	***************************************
STREET	
CITY .	STATE



DUCAS CORPORATION

117 douglas avenue providence 4, r. i.

tel. dexter 1-7784

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LASSY

WORKHOLDERS



A basic tool for many uses and with accessories provides many fast setups for production, eliminating the need for single purpose fixtures. Accurate to .0002.

Lassy Work Holders maintain repetitive work alignment and accuracy.

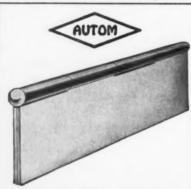


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LASSY TOOL CO.

PLAINVILLE, CONNECTICUT

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CONTINUOUS HINGES

Manufactured by

AUTO MOULDING & MFG. CO.

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CHICAGO 19

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toolroom, pattern shop and other industrial areas, this saw is rugged, modern looking and easy to operate.

The variable speed drive gives the operator a speed range of 50 to 4,500 f.p.m., insuring the correct speed for cutting any of 58 different materials. The exact speed for any operation can be set by turning an easily accessible handwheel. Another feature is the "scientifically designed blade guides." These provide long blade life and accurate, straight cuts. The top blade guide supports the blade down to the top surface of the work and the lower guide supports the blade to within 13/16 inch of the lower surface of the workpiece.

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TOOL DRILLS AND FINISHES IN ONE PASS

A tool which simultaneously drills and finishes holes to size, with a single quill stroke of the machine, is announced by Robert H. Clark Co., P.O. Box 990, Beverly Hills, Calif. It is especially designed for use on thick plate for rapid production of large diameter holes to close tolerances and with excellent finish. The tool consists of a bar, which combines a replacable spade drill with an adjustable cutter for reaming the hole to size. The adjustable cutter is of the floating finishing type; the blades expanding and locking to desired dimension. They are mounted in the bar with cam-lock design, which permits a lateral float



Clark tool drills and finishes in one pass

June, 1959

to the cutter. This enables the cutter to center itself to the hole, insuring extremely smooth, chatterfree finishing to very close tolerances.

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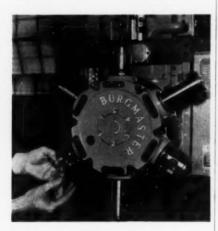
* modern machine shop

TURRET CARRIED PRESSURE FOOT GUIDE

To add strength and rigidity to small drills used on Burgmaster Turret Drilling Machines and to obtain greater accuracy, less drill breakage and long tool life, Burg Tool Mfg. Co., 15001 South Figueroa St., Gardena, Calif., introduces a turret car-

ried pressure foot guide.

Many advantages are obtained for small hole drilling by this tool: the work is held down with spring tension, which eliminates vibration and chatter, one of the chief causes for drill breakage; drills are gripped shorter, reducing torsional twist and chattering, which extends tool life; the drill bushing is built in and the drill does not have to constantly re-enter the bushing; perfect alignment is assured and any chance for drill bending is elimi-



Turret carried guide bushing for guiding small drills on Burgmaster Turret Drills



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WILL YOU BE ONE OF THE

WHO WILL TAKE THIS TRAINING THIS YEAR?



TOOL AND DIE DESIGN offers a high-pay career to qualified men willing to learn through Acme's famous correspondence training! Acme also offers Shop Math or Mech. Drawing courses.

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Dept 116, 50 S. Jefferson, Dayton 2, Ohio

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Quick Acting,

Positive Holding

DRILL PRESS VISE

ONLY \$11.50 F.O.B. Factory

Jaws 41/8" wide, 2" deep, open to 41/4". Sets to any angle quickly, saves set-up time. Weighs 161/2 lbs. Ask your dealer or order direct.



Sales Service Mfg. Co.
2361 University Ave. St. Paul 14A, Minn.

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New RADITURN



CUTS ANY RADIUS

Convex, Concave or Ball

Patented

The accurate short cut for turning any radius.
Adaptable to most any lathe.

Contact your tool supplier or write for details.

RETCO MFG. & SALES

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nated; drill margin wear is reduced, which results in more accurately sized holes; close tolerances between holes is more accurately held because drills cannot travel when starting into the work; total overhang from the spindle bearings is held to a minimum; and the use of the pressure foot guide eliminates the need for center drilling to hold tolerances, thus saving valuable machine time.

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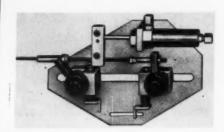
* modern machine shop

ESCAPEMENT FOR AUTOMATIC RELEASE OF CHUTE-FED PARTS

Syntron Co., 309 Lexington Ave., Homer City, Pa., announces an automatic escapement, which has been designed for releasing parts fed through chutes, which can be quickly and easily adjusted to fit changing parts requirements.

The escapement is a standardized unit with adjustable release fingers. Position of the release fingers can be easily changed in a matter of minutes to effect the timed, single or grouped release of any size or shape parts whose aggregate length does not exceed 61/4 inches.

The automatic escapement is also readily adaptable to use on different chutes. Two easy-to-get-at socket screws release or attach the device.



Syntron Automatic Adjustable Escapement

Operation of the escapement is entirely automatic — either by double acting air cylinder or solenoid. It will work on gravity or power fed chutes at a maximum speed of 120 cycles per minute.

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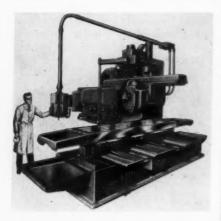
MILLING MACHINE

A milling machine, called the No. 746 Versi-Matic, is introduced by Van Norman Machine Co., Springfield 7, Massachusetts.

This machine is especially designed to cut or shape the newer, tougher, super alloys while maintaining exacting tolerances on big jobs. Table size is 96 long by 24 inches wide, maximum clearance from spindle to table (horizontal) is 35 inches and from spindle to table (vertical) is 22 inches. Weight is approximately 37,000 pounds.

The Versi-Matic is adaptable to either punched or magnetic numerical control systems, and meets or exceeds A.I.A. specifications for medium-sized millers.

The four way cutterhead is used to afford the greatest versatility in cutting



The No. 746 Versi-Matic Milling Machine

B-R-E-A-K...
Hand Finishing Bottlenecks
with Portable Electric
Reciprocating Tools



These handy tools will cut out many tedious hand filing and finishing operations—Increase Production—Produce Uniform Work.

Light in weight— Delivers 1/8" or 1/8" fixed stroke at 1000 strokes per minute— Operates on 110 volts AC or DC.

ACME TOOL CORP.

73 WEST BROADWAY NEW YORK 7, N. Y.

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VERTICAL

At last, a top quality industrial sander that provides all the most wanted features - yet sells for so little. \$89.95 complete-with cord, plug, switch ready to use

Illustrated Literature on Request
A few desirable distributor
territories still available.

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- · Hand Chisel Cut for Hard Metals.
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- · Dealers Inquiries Invited.

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ALSCO Self-Locking Tool and Die Makers' Springs



• Made in four lengths from 1" to 23/4" and eight thicknesses from .010 to .032. Low cost, handy, neat looking.

> Write for details.

ALSCO CO., 1770 Stone Rd., Rochester, N. Y.

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Front Lever Bench



Punches

Capacity: 7/16" hole through 1/4" steel or equal

Weight: 76 lbs.

Stroke: 15/32"

Throat: 2" deep back of punch center.

Catalog on request.

These machines have the characteristic sturdiness of all Lewthwaite tools and are particularly handy because the lever pulls to the front giving the operator full view of the work at all times. Punches and dies are stocked in round, flat, oval, and square sizes.

H. LEWTHWAITE MACHINE

317 East 47th Street New York 17, N. Y.

For more data circle 554 on Postpaid Card 268

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in all positions, without changing the workpiece. The cutterhead can be used horizontally, vertically and angularly to 30 degrees beyond vertical. This machine is available without a saddle, in table lengths up to 130 inches with 30 inch width.

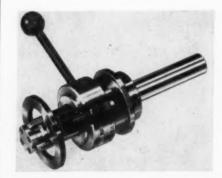
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modern machine shop

SEMI-TAPER ACTION **COLLAPSING TAPS**

A series of Class "ST" collapsing taps, designed for producing smooth threads on especially tough materials. is introduced by Geometric-Horton, New Haven 15, Conn. The "ST" taps are similar to the company's Class "S" collapsing taps; however, they have a semi-taper action for tapping N.P.T. or N.P.T.F. pipe threads.

The semi-taper mechanism permits the chasers to recede during the tripping action, reducing cutting stress as the full threads are being formed. It also eliminates the stop-off lines usually left by jam-cut tapping. It is essential that stop-off lines be eliminated for certain gas and fluid threaded connections in order to prevent



Class ST Semi-Taper Action Collapsing Tap

leakage. Actually, the thread is produced with this tap by the jam-cut principle up to the point of tripping. after which the semi-taper mechanism functions just before collapsing the chasers. Positive adjusting screws in the trip bars have been provided to prevent any movement of the bars during tapping.

Class "ST" taps can be purchased in all sizes of the Class "S" series. The general dimensions of these taps are exactly the same and they use stand-

ard Class "S" chasers.

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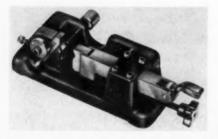
modern machine shop

ADJUSTABLE DRILL FIXTURE

The Dandee Safety-Wire Adjustable Drill Fixture is announced by Ace Drill Bushing Co., 5407 Fountain Ave., Los Angeles 29, California.

This Model SW-15 is a holding fixture for 1/4 to 11/2 inch hexagons, nuts, bolts and so on. The exact location of the safety wire hole in the corners of the hex or in round bodles is completely adjustable. Fast, fingertip pressure on the cam-lock instantly clamps and releases parts to be drilled. providing rapid interchange and speedup of production.

The Model SW-15 weighs 5 pounds. It is light enough for easy handling yet sufficiently heavy to assure maximum stability. Engineered for quick setup, it eliminates expensive tool-up



The Ace Dandee Adjustable Drill Fixture

SOLID HEAD CARBIDE BORING BARS

· Precision made double brazed head for extra long tool life. . Face grinding only, to resharpen solid head - greater service at lower cost. · Longer shank at no extra cost. · Ideal for precision Jig Boring-Boring and Facing shapes available.

literature and price list Dealer Inquiries are Invited TITAN TOOL SUPPLY CO.

Box B, 1419 Hertel Avenue, Buffalo 16, N. Y. For more data circle 555 on Postpaid Card

Accurate Hole Transfer Made Easy With

NIELSEN TRANSFER SCREWS

Simply insert in holes, invert, strike sharply and you have centers and drill



circles perfectly located. Reduce time and eliminate spoilage of other methods. 8 sizes, from 3/4" to 3/4" U.S.S. Inexpensive - Last for years. Write for Circular

NIELSEN TOOL & DIE COMPANY 17336 Lahser Road Near Grand River Detroit 19, Michigan

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The STEVENS Line SINCE 1925

Introducing NEW series



ROTARY TABLES 5-8-12-15-18-24" sizes both standard and dial indexing types ADJUSTABLE TILTING TABLES_ #0-1-2 COMOUND TABLES #1-11/2-2

ROTARY-COMPOUND TABLES ___#1-11/2-2 INDEX CENTERS-multiple spindle

SPECIAL MACHINES—designed and built See your dealer or write for bulletins

The John B. Stevens Company Main Street, Somersville, Conn., U. S. A.

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waiting periods and affords other economies in both short and long runs. Ace Dandee Fixtures are not one-time or single-use tools, but have universal application. They are guaranteed to be accurate. Bodies are finished in black wrinkle, and precision parts have black oxide or electro-film surfaces to assure precise tolerances.

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PNEUMATIC NUTSETTERS

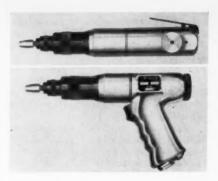
Airetool Mfg. Co., Springfield, Ohio, introduces a line of pneumatic nutsetters. Included in this new line is the Model 400-N Non-Reversible

GRIND THE
Eastern Centerless
Way

WE SPECIALIZE
20 CENTERLESS GRINDERS
ESTABLISHED 1939

Eastern Centerless Grinding Co. 470 Tolland Street East Hartford 8, Conn.

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Two models of Airetool Pneumatic Nutsetters

Pneumatic Nutsetter which is a straight type with a lever throttle. This compact, time-saving tool has power plus, which enables operators to turn out more work per hour with no strain. It is available with choice of an adjustable clutch, positive clutch or direct drive—and in one of four different operating speeds.

The Model 400-NP Non-Reversible Nutsetter is equipped with a pistol-type grip and trigger throttle. It can also be obtained with a thumb rest handle, and operators like its even balance and light weight.

The Model 400-RN Reversible Pneumatic Nutsetter is designed as a straight type with a lever throttle. It can be used for either tightening or removing nuts, and the straight type design is recommended for applica-



of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work now—save money tool

HEIMANN MFG., CO. . URBANA, O

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tions where working space is limited. It can be suspended vertically above the work where it is out of the way

and saves bench space.

The Model 400-RNP Reversible Pneumatic Nutsetter is produced as a pistol-type tool with a trigger throttle. It has two direction operation. The cap reverse operates easily with just a flick of the thumb to change direction of the socket.

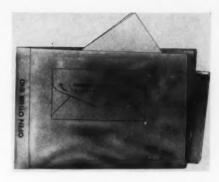
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PADDED SHIPPING BAG

Jiffy Manufacturing Co., 377 Florence Ave., Hillside, N. J., announces a new shipping bag, known as the Jiffy Duo Bag.

An overlapping back seam forms a water resistant envelope which can be used for documents, letters or any first



This shipping bag is the Jiffy Duo Bag

class material. The bag itself is a regular padded shipping bag for product use.

The product can be prepacked in the Jiffy Duo Bag, the shipping documents or first class mail can be inserted at a later time.

For more data circle 163 on Postpaid Card



Prive SET-UP Down!

Making set-ups for tapping and reaming can be done with Ziegler Tool Holders at a lower labor cost than with ordinary tool holders for the simple reason that it takes less time with a Ziegler.

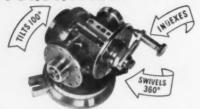
Just align the work to within 1/32" of accuracy on the radius (1/16" on the diameter) and the job is done—because the Ziegler Holder automatically compensates for the inaccuracy.

If you have never used a Ziegler, a big surprise awaits you the first time you give it a trial.

W.M. ZIEGLER TOOL CO. roller drive floating tool-holders 13566 Auburn • Detroit 23, Michigan

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VERSATILITY



DIVIDING HEADS

6½" or 8" swing Swivels in 2 planes Holds work between centers, in chucks and collets.

ACCURACY



5" MACHINE VISE

Plain or swivel base Precision ground screw V-slides with adjustable gibs Oil hardened and ground jaws

ECONOMY

Save time and money with Ellis tools. Write:

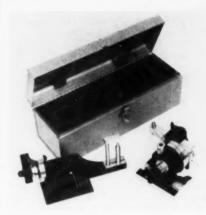
NICHOLS-MORRIS

CORPORATION

76-H MAMARONECK AVENUE WHITE PLAINS, N.Y.

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new shop equipment . . .



Metal storage case for wheel dresser

METAL STORAGE CASE FOR WHEEL DRESSER

Rothfuss Tool Co., P.O. Box 2693, Elmwood Station, Providence 7, R. I., is offering a new metal storage case free with each purchase of a set of its G-5 Radius Dresser and G-2 Angle Dresser.

Designed and built specifically to withstand the inherent dangers of a machine shop, the Rothfuss Storage Case is of strong, durable, lightweight steel, with a hinged top, a heavy duty latch and a properly blocked reinforced interior that insures the safety of the dressers. The strong handle allows it to be carried from place to place just like a small tool kit.

For more data circle 164 on Postpaid Card

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ALUMINUM BRONZE WEAR PLATES

The Ohio Knife Co., Dept. HH-90, Cincinnati 23, Ohio, announces aluminum bronze wear plates. These O-Kni-



O-Kni-Co Wear Plates on an auto body die

Co Wear Plates have 1/4 inch of aluminum bronze bonded to a tough, easily machinable, steel backing. This gives greatly increased wear properties. They are used in many applications, including use as slides in cam dies, or wherever there is a sliding action between flat metal parts. They are delivered to the customer completely finished, ready to use. Fourteen standard cross sections from 1/2 to 11/4 inch thickness; 11/2 to 8 inch widths; in 72 inch lengths are carried in stock ready for immediate delivery. Drilling and counterboring can be done right through the aluminum bronze.

For more data circle 165 on Postpaid Card

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CENTERING AND LAPPING ATTACHMENT FOR DRILL PRESSES

Federal Machine Tool Co., Emmett St., Bristol, Conn., announces a centering and lapping attachment for round column floor type drill presses. This attachment is designed to perform two individual operations: drilling, and lapping or honing centers.

Heretofore, these operations were usually performed in a lathe. This attachment has several big advantages: (1) It can easily center drill and lap centers to a uniform depth, which is very important in grinding a number of parts to uniform straightness.



June 15-19—Detroit—Booths 261-266.

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Eliminate excessive overhang of your center. Use the accurate, rugged, reliable *NIROL. The spring loaded Live Center that compensates for expansion and contraction in actual operation.

Write for complete information.

*Reg. U.S. Pat. Off.

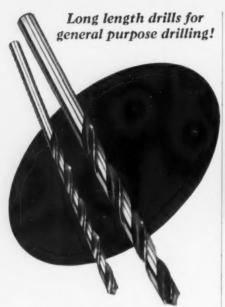
22, N. PLAINFIELD, N. J.

273

NIROL MANUFACTURING

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modern machine shop



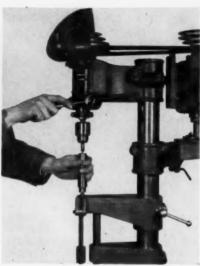
TAPER LENGTH DRILLS

Feature for feature, you can't beat Ace Taper Length Drills. First, because they're made of the finest quality high speed steel properly heat treated to assure the ultimate in uniform hardness. Second, because they're produced by the Ace-originated "groundfrom-the-solid" process to give them smoother, more highly polished flutes with keener, stronger cutting edges. And finally, because they cut faster, last longer, give you more production per drill at lower cost. Call your local Ace Drill Distributor today!

ADRIAN, MICHIGAN

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new shop equipment . . .



Federal Centering and Lapping Attachment

(2) Grit that would normally deposit in lathe dovetails and bed would be eliminated. (3) Much easier handling of parts plus a savings of setup time. (4) Attachment also provides a diamond dressing tool for dressing lapping stones. The diamond dressing tool is mounted on a pivot and can swing out of way when not in use, yet is attached so as not to be misplaced.

Alignment while making adjustment to accommodate various lengths of work is maintained by a guide rod fastened in top bracket. This guide rod slides freely in lower bracket, which is anchored on the column of the drill press, as illustrated.

For more data circle 166 on Postpaid Card

modern machine

HIGH TEMPERATURE FURNACE

Lucifer Furnaces, Inc., Neshaminy ORIGINATORS OF "GROUND-FROM-THE-SOLID" DRILLS 6, Pa., has added the 6055E High

New SIMPLEX TOOLMAKERS MICROSCOPE

YOU GET

A COMPLETE TOOLMAKER MICROSCOPE of 2" x 2" range in .0001" at a basic price of \$1150. Compare this outstanding value.

Request catalog 81/155





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Supersensitive **Hand Tapper**

New exclusive features and top quality make Lassy Tappers outstandingly the finest available. Write for New illustrated catalog on Time Saving Devices.

LASSY TOOL COMPANY, Plainville, Conn. For more data circle 566 on Postpaid Card

REICH - THE ONLY 3-WAY PRECISION TEST INDICATOR

Accurate and repeated reading in either direction. No mirror needed to read both sides or top. Non rust, non magnetic movement. .014" reading.



J. R. REICH MANUFACTURING CO. 201 E. Stroop Road Dayton 29, Ohio For more data circle 567 on Postpaid Card

June, 1959

UNIVERSAL DIVIDING HEADS



· Precision built to meet every requirement, Carroll Dividing Heads are the accepted standard in metalworking plants from coast to coast. . A unique optional swivel base makes possible speedy and accurate work settings to

Work Head or Rotary Table. Write for 8 page catalog giving complete details, etc. Other Models 6" With or Without Direct Indexing.



3525 Cardiff Ave.

Cincinnati, Ohio

For more data circle 568 on Postpaid Card modern machine shop 275

SUPERIOR® INDICATOR

A Low-Priced Dial Type Indicator within 1/8". Double Faced. Reads front and back. Two Crystals. Double faced dial indicator com plete with plated holder including 1/32" and 1/4" contacts — Superior Indicator #50....\$8.95 Superior Indicator #75X

with Universal Swivel. . \$10.95 Thousands of satisfied customers!

SUPERIOR INDICATOR CO. P. O. Box 734, Rochester 3, N. Y.



For more data circle 569 on Postpaid Card

BOLT SHIMS



Shims fit standard bolts and eliminate the need for re-counterboring or turning of bolts to maintain stripper height when sharpening dies.

Write for complete details.

ALSCO CO., 1770 Stone Rd., Rochester, N. Y.

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TOOL ROOM ACCESSORIES CONTROL BALL HANDLES





Round Plastic

Mushroom Plastic



Designed for machine tools. iigs, fixtures, etc. Round and oval plastic types can be supplied in red and black. Made in many diameters and thread sizes. Can also supply highly polished steel ball handles.

FREE 78 Pg. Catalog

Send for it today. Lists scores of items needed in every tool room such as hand knobs, compression springs, hand wheels, clamping handles, etc.

REID TOOL SUPPLY CO. MUSKEGON HEIGHTS MICHIGAN

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Lucifer 6055E High Temperature Furnace

Temperature Furnace to its line of standard production models. This is of box-type construction and includes elements with heat ranges to 3.190 degrees F. Resistance of the clements does not change with use.

The 6055 Series includes seven models in box or tube design. All furnaces are complete units and include an automatic controller (indicating and controlling), platinum-rhodium thermocouple, magnetic contractor, high temperature elements, terminals, aluminum strips for terminal connections, selector switch and an element transformer.

For more data circle 167 on Postpaid Card

modern machine shop

19 INCH COLUMN RADIAL DRILL

The American Tool Works, Cincinnati 2, Ohio, has added a 19 inch column radial drill to its line of "American" Hole Wizard Radials. This new size is available with 6, 7 and 8 foot arms and with a full com-

plement of accessories.

In order to meet the most exacting current demands and in anticipation of increasing demands in the future, particular emphasis has been placed upon the all-important factors of power, rigidity, stability and convenience of operation. As an indicaton of the power of these machines, they are designed and proportioned to transmit

the full overload capacity of 30 h.p. motors, while the column and arm designs permit the utilization of this power with the very minimum of deflection and resultant work inaccuracy.

In addition, a valuable feature that adds greatly to the effectiveness and usefulness of these machines is the provision that has been made for performing highly accurate boring. counterboring and spotfacing opertions. To provide for these functions, boring mill type spindles are used, which are precision Timken bearing mounted with convenient adjustment from the outside of the head and are made of nitrallov steel, nitrided for extreme surface hardness impervious to wear. The super accuracy of these spindles particularly appeals to users and prospective users of ultra precision positioning (spacer) tables as being essential to the production of highly accurate spacing and of jig borer types of work.

The function of tapping has also been recognized as an important qualification by providing a 40 percent speed-up of the spindle on reverse, in



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"Coolie-Grinderlap" by Diamond Tool Company

LOOK HOW EASY



Vimcolights adjust instantly to suit the operator's needs. No screws or bolts to loosen, — then reset. Vimcolights remain rigidly in position regardless of vibrations even on heavy presses and forges. Six standard models are available . . . send for Folder 85. Machine designers send for "OEM Bulletin".

Vimcolights are



VIMCO MFG. CO., Inc.

Since 1919

111 BRAYTON STREET • BUFFALO 13, N. Y. For more data circle 575 on Postpaid Card

50 Millionths Reading Mahr SELF-CENTERING GAGES Check bores for size, out-ofround and taper in any spot and to any depth within range of instrument to an absolutely reliable accuracy of 50 MILLIONTHS of an inch THIS HIGH PRECISION INSTRUMENT IS AN INEXPENSIVE, ACCURAT AND DEPENDABLE INTERNAL COMPARATO PRICE \$126.00 Complete in Hardwood Case TO 288" \$110.00 dward Care GUARANTEED (Male) QUALITY PRECISION MEASURING

L 274-MO LAFAYETTE ST. • NEW YORK 12, N.Y. AND FIRE TOOLS

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LOWEST PRICES

Diamond Wheel Dressers

Guaranteed to be full, individual stones, mounted in $7/16 \times 6^{\prime\prime}$ cold rolled shanks

Carat Price

1/4—\$ 2.25

1/2— 4.00

3/4— 6.00

1 — 8.25

11/2— 12.00

2 — 16.00

- * These diamonds can be set in any shank to your specification for \$1.00 each extra
- * Prompt resetting service

Allstate Diamond Products, Inc.

Manufacturers of a complete line of diamond tools and wheels

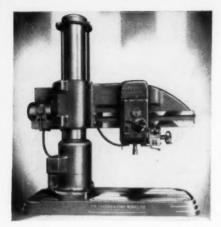
245 W. 27th St., Dept. F. New York 1, N. Y.

CHickering 4-7725

★ Dealers' inquiries invited

For more data circle 577 on Postpaid Card

June. 1959



The American Hole Wizard Radial Drill

order to minimize the unproductive time of backing the tap out of the tapped hole.

For more data circle 168 on Postpaid Card

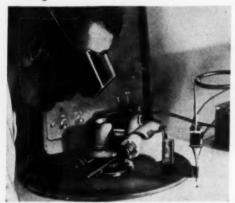
MACHINE DRILLS OR TAPS UP TO 12 HOLES SIMULTANEOUSLY

Precision Tool & Mfg. Co. of Illinois, 1305 South Laramie Ave., Cicero 50, Ill., introduces a multiple spindle drilling and tapping machine. Called the Deka-Drill, the machine is available in either a manual (M 712) or hydraulic model (H 712).

The two models are essentially alike, except that the M 712 is manually operated by hand or foot pedal, while the H 712 is a fully automatic cycle machine tool. The Deka-Drill has a 2 h.p., 1,200 r.p.m., three phase motor.

On the Model H 712, a 1½ h.p. motor drives the hydraulic pump, which is bolted directly to the motor face for perfect alignment. The rated capacity of the pump is 700 p.s.i., however, the pump is set at 360 p.s.i. activating, in turn, a 3 inch double-end cylinder, boosting the pump capacity 6.3 times. The four-way valve is provided with an open center, so that

People work better when they SEE BETTER®



Lockheed Aircraft Corp., Missile Systems Div., uses MAGNI-FOCUSER to watch Ultrasonic Drill making holes five thousands of an inch, the size of human hair.

For increased production, greater accuracy, fewer accidents and errors, use the MAGNI-FOCUSER—the new 3-D binocular magnifier with matched prismatic lenses. It provides needlesharp vision — greatly magnified and in third dimension.

Scores of industrial jobs are being aided by the MAGNI-FOCUSER. It reduces eye strain and avoids squinting; leaves both hands free to work. It's light weight; can be worn with or without eye glasses; normal vision resumed simply by raising the head.

Speed your production by ordering now on 10-day trial basis without obligation. Only \$10.50. Immediate delivery. Or write for illustrated folder.

MAGNI-FOCUSER

the 3-D Magnifier that speeds production and leaves both hands free to work

EDROY PRODUCTS CO., Dept. P, 480 Lexington Ave., New York 17, N. Y.

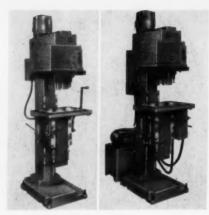
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CINCINNATI 31, OHIO

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The above Deka-Drill Drilling and Tapping Machines are available in either the manual (left) or the hydraulic (right) models

when the machine is not in cycle, the hydraulic motor and pump are idling.

Both standard models are capable of drilling and tapping up to and including a total of 12 holes; more spindles

For LOW COST Hole Production





2 to 15 spindles — drilling area to 351/2" MULTI-DRILL to Fit the Job

Commander MULTI-DRILLS — adjustable multiple

Commander MULTI-DRILLS — adjustable multiple spindle drill press attachments—are sold and serviced by a nation-wide network of Commander Distributors—experienced, helpful specialists in solving drilling and tapping problems. Write for the name of your nearest Distributor and the complete Commander Production Tool Catalog which contains full details on every MULTI-DRILL and many other production drilling and tapping tools.

Commander MFG. CO. 4224 WEST KINZIE STREET CHICAGO 24, ILLINOIS

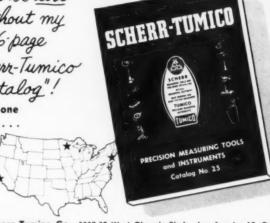
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Get YOUR copy at any one of our 1586 dealers or .

... write for YOUR copy to any of our 3 "Coast to Coast" locations:



- *WEST COAST OFFICE: Scherr-Tumico Co. 3337-39 West Olympic Blvd. Los Angeles 19, Cal
- * MIDWEST OFFICE & FACTORY: Tubular Micrometer Co. St. James, Minnesota
- CO., TC. 200-MM LAFAYETTE STREET NEW YORK 12, N.Y. OFFICE:

For more data circle 582 on Postpaid Card



5" Hinged Sine Plate

features 61/4" x 61/4" WORKING SURFACE with 3 T slots

Positive locking provides rigid setup for light ma-

chining operations. .2000" recess in base makes small angle set-ups easy. Precision ground base and body and hard-

ened rolls insure accuracy, Heavy end and side plates. A precision tool at LOW COST.

\$195.00 with oak case

Price W/ Cent Width No Dist. Case \$109.50 1805 5" 3" 1806 50 61/40 195.00 265.00 1810 5"



F.O.B. St. Paul. Order your sine bar or sine plate from the complete Bald Eagle line starting at \$26.50 from your dealer or direct.

BALD EAGLE PRODUCTS DIV. 356 Cedar Street, St. Paul 1, Minnesota

For more data circle 583 on Postpaid Card



many time-consuming industrial tasks

CERROTECHNICS encompasses various methods of employing CERRO* ALLOYS (bismuth*lead*tin*cadmium) to shortcut many laborious industrial operations. These procedures can save valuable time and lower costs in:

- Anchoring stationary machine parts
- Bending thin-walled tubing
- Electroforming molds
- Holding permanent magnets
- Making chuck jaws-molds for plastics
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And 55 other jobs you can do better, in minutes instead of hours, using CERROTECHNICS.



Send for our new "HOW TO" booklet, No. J4. See us at the Design Engineering Show, Philadelphia, May 25-28, Booth 303.

CERRO DE PASCO SALES CORPORATION 304 Park Avenue, New York 22, N. Y.

For more data circle 584 on Postpaid Card

modern machine shop

June, 1959

281



For more data circle 585 on Postpaid Card

new shop equipment . . .

can be supplied on special order. Deka-Drill can perform a multitude of drilling and tapping operations with speed and efficiency. These operations include automatic cycle operations with special tooling.

For more data circle 169 on Postpaid Card

* modern machine shop

BROACHING MACHINE

The Lapointe Machine Tool Co., Hudson, Mass., has introduced a broaching machine to sell at such a moderate price that it is expected it will encourage a great many firms to use broaching for certain operations that had formerly been machined in some other way.

The "Eager Beaver" Small Pull Down Lapointe Broaching Machine is midget size rated 1½ ton at 5 f.p.m. broaching speed, and ¾ ton at 10 f.p.m. It is built with a 12 inch stroke. Standard equipment comprises two



Lapointe Eager Beaver Broaching Machine





Knurled, wedge-shaped grip and precise balance make these ideal for the most severe stamping applications. Write for Bulletin 504.



M. E. CUNNINGHAM CO.

1051 CHATEAU STREET, PITTSBURGH 33, PA. For more data circle 586 on Postpaid Card



For more data circle 587 on Postpaid Card June, 1959

POWER!



...FOR
LARGE
HOLE
TAPPING

The New Procunier Tap King represents a major advancement in large hole tapping units. Powerful, dependable, it can tap in steel up to 1½" thick—and hold a class 2 fit with ease! It combines heavy duty ruggedness with delicate precision, to give you the best all 'round BIG tapper for BIG jobs! Operators like its super-sensitive action—management appreciates the many cost-saving features—including longer tap life, consistently uniform threads, fewer spoiled pieces. It consistently turns out more higher quality work in less time, with less effort. Where cost counts and precision is paramount—the TAP KING is the tapper for you!

Write for FREE Circulars

Get the whole story on this remarkable unit, the full line of Procunier Tappers and the New Lead Screw PUSH BUTTON TAPPER. They're Free!



PROCUNIER SAFETY CHUCK CO.

12 S. Clinton St. ● Dept. 6 ● Chicago 6, Illinois For more data circle 588 on Postpaid Card

modern machine shop

283

Now

TONING with the

horizontal optical jig borer offers you increased ACCURACY VERSATILITY PRODUCTIVITY

Made in Switzerland Measurement in inches



- Automatic positioning can be changed instantly to manual operation
- · Projected optical setting-direct reading to .00005" for linear motions and I sec. of arc for built-in rotary table. Linear optics provided with adjustable zero reference
- · Simplified controls functionally arranged for greater operating speed and efficiency
- 3" diameter boring spindle
- Increased capacity: table size 3938" x 32"; 2958" cross travel; 235g" longitudinal travel; 255g" vertical travel • Hydraulic feeds and infinitely variable spindle speeds
- · Rear support optional

MBI has engineers available for consultation, guarantees service by factory trained staff, and stocks spare parts in New York.

> Demonstrations upon request at our conveniently located demonstration centers.

M. B. I. EXPORT & IMPORT LTD.



A DIVISION OF MACHINERY BUILDERS, INC. 475 Grand Concourse, Bronx 51, N. Y.

"Over 25 years' experience in designing and building machinery."

For more data circle 589 on Postpaid Card

cutting speeds and mechanism for

adjusting the stroke.

This bench size pull down broaching machine is only 31 inches wide, 20 inches front to back and 34 inches high. The hole in the drawhead is 1½ inches, the hole in the platen is 5 inches and the platen dimension (working surface) is 17 by 18½ inches. It weighs 500 pounds. It is self-contained, readily portable and can be plugged into any 110 volt outlet. This machine has a mechanical screw type drive with all moving parts lubricated. It is designed for an automatic broach puller and coolant.

Though small and compact, it is built for precision broaching and performs with outstanding accuracy on all work of a size and type within its capacity. It is suited to the broaching of small missile parts with its ability to perform to extremely close tolerance required in that field.

For more data circle 170 on Postpaid Card

CERRO* ALLOYS

do jobs in minutes instead of hours

CERRO (bismuth-lead-tin-cadmium) ALLOYS are extensively used in many* diversified industrial operations. CERRO ALLOYS melt at low temperatures and several tend to expand as they harden. They are easy to work with, neat, strong, versatile, can be remelted and reused over and over again. Used in design and development work and to improve products and simplify processes, these efficient, economical alloys save time, lower costs and increase profits. Various combinations of alloys are available, many "custom-blended" to fit your exact needs.

To learn more about CERRO ALLOYS and their wide range of applications, send for our new, illustrated "HOW TO" (No. J4) booklet.



- † T.M. Cerro de Pasco Corporation.
- * 63 Applications at the latest count.

CERRO DE PASCO SALES CORPORATION 304 Park Avenue, New York 22, N. Y.

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Another

VICTOR VALUE

Top Quality Lowest Prices

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DIAMOND WHEEL DRESSERS

Made of selected, full individual stones, mounted in 7/16" diameter x 6" long cold rolled shank.

Karat	Regular Price	Our New Price
1/4	\$ 6.00	\$ 2.85
1/2	12.00	5.00
3/4	21.00	7.50
1	30.00	10.25
11/2	54.00	15.00
2	75.00	20.00
21/2	102.00	26.00
3	130.00	32.00

These diamonds can be set in any shank to your specifications for \$1.00 each extra.

Order today—Immediate Shipment From Stock!

VICTOR

MACHINERY EXCHANGE, INC.
Dealers in Tool Room Equipment
Dept. B, 251 Centre St.

Tel.: CAnal 6-5575, New York 13, N. Y.

For more data circle 591 on Postpaid Card

modern machine shop

SPEED UP DRILLING & TAPPING JOBS!



square stock or standard or odd-shaped rough castings from 1/2" to 8"

O.D. Will cut tooling and production costs to minimum for 10 to 100,000 pieces. minimum for 10 to 100,000 pieces. Standard removable slip fit bushings and holders available to drill center or mean off-center. The self-centering action will hold within .0015" or better regardless of jig wear or piece part 0.D. variation. Jigs available in three sizes 6", 8", 14", jaw openings 2", $3^14"$, $7^12'$.

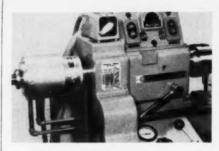
Write for complete information HEUSER MANUFACTURING CO

1640 N. Paulina St.

Chicago 22, III.

For more data circle 592 on Postpaid Card

new shop equipment . . .



The PowerGrip Chuck Actuator in use

CHUCK ACTUATOR

PowerGrip, Inc., Rockfall, Conn., announces a chuck actuator that is a light weight, aluminum, non-rotating air cylinder, designed to operate air chucks or collets on lathes, grinders and other machine tools which use a chuck or collet to hold the workpiece. It is mounted on the rear end of the

"IMP" MULES ... real work and time savers



For more data circle 593 on Postpaid Card

DORDEN Vertical Unit

Now you can convert your horizontal mill into a high speed vertical . . . quickly and easily.

Fits directly on any 1" regular horizontal milling machine arbor. Pressure built for long dependable service.

Available in rigid or swivel types. Write for folder.

18750 FITZPATRICK AVENUE DORDEN & CO... **DETROIT 28, MICHIGAN**



For more data circle 594 on Postpaid Card

286

EXTRAORDINARY
PRECISION & QUALITY

NEW MACHINERY Incomparable Values!

LIBERAL TERMS

RENTAL PLANS



ELB SURFACE GRINDER

High Output with High Precision Direct Drive Spindle Grinding Capacity from 10" x 18" up to 54" x 236"

price from \$3730.

EAGLE

HORIZONTAL SURFACE GRINDER

Incomparable

Incomparable Price!

Grinding Capacity:
6" x 18" - 8" x 24"

High accuracy & Precision.



BURDETTE Hydraulic Horizontal SURFACE GRINDER 6" x 18" and 8" x 24" price from \$2975

AGENTS WANTED

IMPERIAL H D
HEAVY DUTY LATHE 16" - 20" - 24" SWING

Modern, high precision Lathe, elevated output, chip pan in single piece, 2 legs. Up to 25 H.P.



AARON MACHINERY CO., Inc.

DEPT. M 45 CROSBY ST., N. Y. 12 . WA 5-8300

BRANCHES AT:

BUFFALO, N. Y. RICHMOND, CAL.
MINEOLA, N. Y. LOS ANGELES, CAL.
HOUSTON, TEXAS TULSA, OKLA.

See other ad Page 289

new shop equipment . . .

machine tool spindle, and is connected, through ball thrust bearings, to the drawtube which, in turn, operates the chuck or collet.

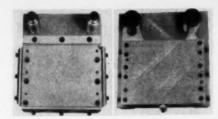
The PowerGrip Chuck Actuator will provide the following: power holding for both bar and chucking work; no limits on spindle speeds; grip and release work without stopping the spindle: constant holding pressure; easy to operate; air operated in both directions: and low maintenance.

For more data circle 171 on Postpaid Card



DIE SET

A Ball Bearing Master Die Set is announced by Lempco Industrial, Inc., Bedford, Ohio. This die set offers complete interchangeability-all parts are interchangeable with like parts of



(Left) Top of the Lempco Ball Bearing Master Die Set, (right) bottom of the die set.

every other Lempco Master Set anywhere. This means a considerable saving. One Master Die Set may be used for a number of dies; save on die sets, save on storage and handling.

The Lempco Master Set features quick setup and easy changeover, mounts dies for processing all materials. The set has a company's ball bearing feature, which eliminates lubrication worries and guarantees best alignment for millions of strokes. For more data circle 172 on Postpaid Card



Order from Your Supplier or Write for Tool Catalog

DREMEL MFG. CO., Dept. 229F, Racine, Wisconsin

For more data circle 596 on Postpaid Card

June, 1959

\$27.50

For more data on advertisement on opposite page, circle 597 on Postpaid Card -

Moto-Tool only

Model No. 2 Moto-Tool Kit

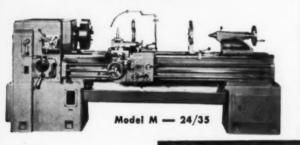
with 23 accessories storage case \$2

IMPERIAL PRECISION LATHES

FROM 12" SWING TO 100" SWING 30" CENTERS UP TO 300" CENTERS

LIBERAL TERMS RENTAL PLANS

Model PS -34/61



Flame hardened, ground bed ways. Heat-hardened gears throughout. Precision roller spindle bearings.

Sizes in inches **Basic Price** 12x40 \$ 1393. 14x40 \$ 1593. 16x40 \$ 2084. 18x40 \$ 3447. 20x40 -\$ 3647. 24x40 \$ 8220. 31x40 \$ 9790. 34/62 sliding bed x 60 \$13790. 34x60 \$11180. 45x57 \$16980. 67x57 \$21280. Extra large holes through the spindles up to 131/2"



AARON MACHINERY CO., Inc.

DEPT. M 45 CROSBY ST., N. Y. 12 . WA 5-8300

BRANCHES AT:

BUFFALO, N. Y. RICHMOND, CAL.
MINEOLA, N. Y. LOS ANGELES, CAL.
HOUSTON, TEXAS TULSA, OKLA.

See other ad Page 287

SELF-OPENING STUD SETTERS

Scully-Jones and Co., 1909 South Rockwell St., Chicago 8, Ill., is now manufacturing a line of self-opening stud setters.

The design features of these automatic setters offer many unique advantages. For example, jaws that grip the stud remain open until studs are fully seated in the driving position. Positive grip and fast action permit plated or



Safe-Torque Self-Opening Stud Driver



SQUAR-VISE

- · A Universal precision squaring setup.
- A precision machine vise for profilers, pantograph machines, duplicators, jigborers and surface grinders.
- It stays square under clamping pressure,
- It is hardened and ground to supersquareness on all surfaces. Clamps are removable for setting up purposes.

Write for Literature

KEARSARGE TOOL & MFG. COMPANY, Erie, Pa.

For more data circle 611 on Postpaid Card



To remind you of CLOVER COMPOUNDS...

Many modern craftsmen practice the art of lapping and grinding with abrasive compounds. Clover sales prove it.

But we all need reminding, especially when new processes or products are being developed, that abrasive compounds often provide the most economical as well as the most accurate method of producing specified surfaces or shapes. Lapping or grinding

with compounds offers many possibilities for tools and dies as well as for precision end-products. A check of available grains, vehicles, and methods before tooling up can be rewarding. Grains come in a full range of grit sizes, the viscosity of the vehicle is adapted to the required application, and the compound may be grease-mixed or water-soluble.

Ask your distributor, or write us, for suggestions on uses of Clover Lapping and Grinding Compounds.

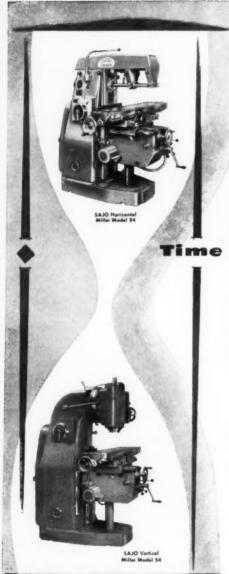
Clover Manufacturing Company

Norwalk, Connecticut

VIctor 7-4515

Makers of the Famous CLOVER COATED ABRASIVES

For more data circle 598 on Postpaid Card



We can't turn back the calendar, but you can buy SAJO Millers today at the same price you paid for a comparable machine tool in 1949.

stood still ...

Produced by Sweden's master craftsmen, these modern machine tools are engineered to maintain precise tolerances in continuous heavy-duty production. An example is the unique SAJO spindle construction employing SKF precision 2-row staggered roller bearings followed by thrust ball bearings, providing better load distribution and silent, vibration-free operation.

Built to U. S. standards, SAJO Millers are recognized for their accuracy, dependability and long life.

Condensed specifications:

table 52" x 11" longitudinal movement 33½" 16 spindle speeds, 39-1500 r.p.m. American Standard Taper No. 50 main drive motor 7½ h.p. feed motor 1½ h.p.

Accessories:

Universal Dividing Head, Rotary Index Table, Vertical and Universal Milling Attachments, Slotting Attachment, Vises. Arbors,

Also available:

SAJO Plain and Universal Millers, table size 411/2" x 91/4".

Here are "hindsight" opportunities for foresighted machine tool buyers.

Write for literature and references in your area.



76-H Mamaroneck Avenue, White Plains, N. Y.

HORIZONTAL AND VERTICAL SHAPERS—POWER HACKSAWS
Fast Service and Parts Available from Malar Cities

For more data circle 599 on Postpaid Card

June, 1959

modern machine shop

291

new shop equipment . . .

tight studs to be driven with little or no marking. Broken studs are easily disposed of by tapping lightly on the driver casing.

The Style B is offered in three sizes for studs from 1/8 to 7/8 inch in diameter and 15/32 to 2 11/16 inch in height of set stud. Style M comes in two sizes for studs from 3/16 to 3/4 inch in diameter and 21/32 to 21/4 inches in height of set stud. For more data circle 174 on Postpaid Card

modern machine shop

SPEED REDUCERS

The Ohio Gear Co., 1333 East 179th St., Cleveland 10, Ohio, announces a line of high quality fin and fan cooled speed reducers. Known as the Hi-Line

> designed external cooling fins plus a powered cooling

The speed reducers, which use heavy duty worm and gear reduction, also feature heavy capacity bearings, shorter center distance between the worm and the gear and improved heat dissipation characteristics.

The Model S (illustrated) horizontal, right angle model is available with output shaft above or below center. Sizes range from 1.33 to 5.25 inches center distance.

For more data circle 175 on Postpaid Card



The Ohio Gear "Hi-Line" Speed Reducer

Series, the reducers feature specially

COMPARE Hi-Lo CLAMPING WITH YOUR PRESENT METHOD



Buy This Hi-Lo STARTER SET

Machine-Tool Clamping System

With the Hi-Lo Clamping System, you can save money, time and labor. This system leads to safe, rigid, parallel clamping on T-slot tables or bolster plates.

The Hi-Lo Starter Set makes one clamp for any toolroom or job-shop setup between 36 and 11". More important, it lets you compare the Hi-Lo System on the same jobs with your present methods. Bolt length and heelblock height are adjustable over the full range of the clamp.

Complete milling machine and boring machine sets are available or you can build up your system to meet your own clamping needs. Full allowance for Starter Set given when purchasing a larger set.

Write for literature and names of distributors.

Hi-Lo PRODUCTS COMPANY

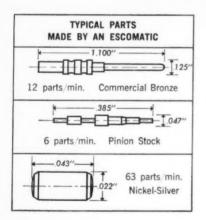
Division of Steel City Testing Machines, Inc. 8823 Lyndon Ave. Detroit 38. Mich.

For more data circle 600 on Postpaid Card

Produce Small Parts Faster
At Lower Cost With



Feed from Coil or Bar Stock



Up to 100 precision parts per minute are possible on the Esco DS 2, a Swiss form-turning and cut-off machine. Stock, fed from coils or bars of any length, is machined by two revolving cutting tools mounted in a cam controlled tool head. Resulting parts are clean, accurate and entirely burr-free—and are delivered separate from the chips. Coil feed provides efficiency up to 95%, eliminates bar ends, speeds production.

- Capacity Up to 5/32" dia. x 33/4" length
- Accuracy As close as ±.00025"
- Finish As fine as 8 micro-inches

Write For Additional Information

COSA

nationwide sales and service of precision machine tools—
 from bench lathes to boring mills.

COSA CORPORATION, 405 LEXINGTON AVENUE, NEW YORK 17, N.Y.

IN CANADA contact COSA CORPORATION OF CANADA, LTD., 1160 Lakeshore Road, Long Branch, Toronto 14, Ont.

For more data circle 601 on Postpaid Card

where to get it

where to get it

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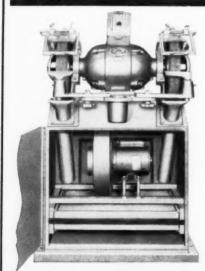


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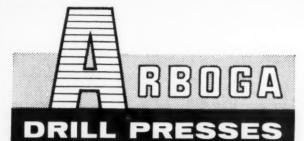
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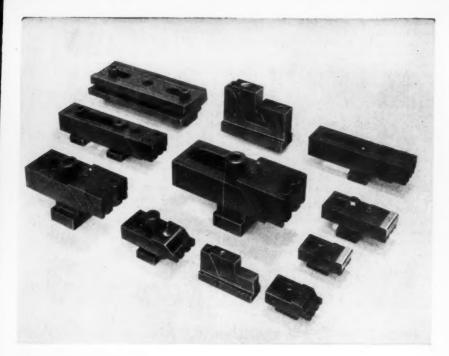
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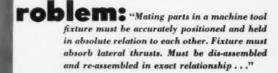
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